DURGAPUR INSTITUTE OF ADVANCED TECHNOLOGY & MANAGEMENT

NH2, G.T. Road, Rajbandh, Durgapur, Pashchim Bardhaman, West Bengal- 713212

POs, PSOs and COs for All Programs

(2019-2020)

1. Program Outcomes:

1.1. CSE

- PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex problems engineering.
- PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
- PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

1.2. IT

- PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- PO2: Problem analysis: Identity, formulates, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and the cultural, societal, and environmental considerations.
- PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

- PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO 9: MaulanaAbulKalamAzadUniversityofTechnology, WestBengal Syllabus for 4-Years B.Tech. in Information Technology
- PO 10: Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO 11: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO 12: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO 13: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

1.3. ECE

- PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the

public health and safety, and the cultural, societal, and environmental considerations.

- PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one?s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

- PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

1.4. EE

- PO 1: Engineering Knowledge: Ability to apply mathematical, scientific, and engineering principles to the identification, formulation, and solution of practical electrical engineering problems
- PO 2: Problem Analysis: Ability to do experiments & to sense, process, analyze and interpret data using modern engineering tools and techniques leading to decision making in real time for electrical engineering systems and processes
- PO 3: Design/ development of solutions: Ability to design engineering processes and products to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability
- PO 4: Conduct investigation of Complex Problem: Ability to conduct complex electrical designs and interpret different experimental data using research-based knowledge and research methods
- PO 5: Modern Tool Usage: Ability to apply modern tools like MATLAB,PSCAD, LABVIEW and also different other IT tools for modeling, prediction of complex electrical engineering activities with an understanding of limitation.
- PO 6: The engineer and Society: Ability to analyze important social problems and identify ways to contribute to solutions, including professional, economic, and ethical considerations in generation, transmission, and distribution of electrical energy
- PO 7: Environment and sustainability: Ability to analyze important environmental issues and identify ways for sustainable development, in generation, transmission, and distribution of electrical energy
- PO 8: Ethics: To understand and commit to professional ethics and responsibilities and norms of engineering practice.
- PO 9: Individual and Team Work: Ability to function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
- PO 10: Communication: Ability to communicate effectively in both writing and speaking and to prepare formal technical plans leading to solutions and detailed reports for electrical systems

- PO11: Project management and finance: Ability to understand management and business practices in engineering works and multidisciplinary areas.
- PO 12: Life-long learning: Ability to recognize the need for identifying contemporary issues due to changing technical scenario and engage in lifelong learning

1.5. ME

- PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2: Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of the need for sustainable development.
- PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

- PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life- long learning in the broadest context of technological change.

1.6. CHE

2. Program Specific Outcomes:

2.1. CSE

- PSO1: Professional Skills: The ability to understand, analyse and develop computer programs for efficient design of computer based systems of varying complexity.
- PSO2: Problem solving Skills: The ability to apply innovative practices and strategies in software projects development using recent state-of-the-art programming environments to deliver quality products.
- PSO3: Innovation and Entrepreneurship: Knowledge of social & environmental awareness along with ethical responsibility to achieve a successful career addresses the real world applications using optimal resources as an entrepreneur.

2.2. IT

- PSO 1: Ability to plan and design information systems to standard specifications
- using efficient algorithms in the relevant programming language(s).
- PSO 2: Ability to use knowledge in diverse domains to recognize research gaps and thus to offer solutions to innovative ideas.

2.3. EE

- PSO1:Be able to analyze and understand mathematical, scientific and engineering fundamentals to Identify complex engineering problems and design system components or processes considering health, safety, cultural, societal and environmental aspects.

- PSO2: Conduct research based investigation including design of experiments interpretation of data Synthesis of information usages of modern engineering tool to solve complex engineering activities with an understanding of the limitations related to societal health safety and legal issues.
- PSO3:Apply ethical principles related to societal and environmental context in a multidisciplinary Setting as an individual or in a team.
- PSO4:Able to comprehend effective reports and design documentation considering management and financial principles that will benefit the society at large for life long period in the broadest context of technological changes.

2.4. ECE

- PSO 1: (Engineering Knowledge and Analysis): Analyze specific engineering problems relevant to Electronics & Communication Engineering by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals.
- PSO 2: (System Design): Design electrical, electronics and communication systems containing electrical/electronic devices, software, and hardware using the significant analytical knowledge in Electronics & Communication Engineering and Computer Sciences, and applying modern tools.
- PSO 3: (Application of the knowledge on society/environment): Apply the contextual knowledge of Electronics and Communication Engineering to assess societal, environmental, health, safety, legal and cultural issues with professional ethics and function effectively as an individual or a leader in a team to manage different projects in multidisciplinary environments as the process of life-long learning.

2.5. ME

- PSO1: Inspiring students and preparing them for successful professional careers by applying the

- Knowledge of applied science and fundamental Mechanical Engineering core subjects and advanced Mechanical Engineering software.
- PSO2: Ability to co-ordinate and communicate in groups by diversifying their knowledge domain in different engineering disciplinary area.

2.6. CHE

COMPUTER SCIENCE & ENGINEERING
SEMESTER-I
THEORY

Course Title: Mathematics –IA	**Code: BS-M101**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-M101.CO1	Learn the basic mathematical tools to deal with problems of engineering sciences.	Learn	Level I
BS-M101.CO2	Understand properties and application of Calculus and Linear Algebra .	Understand	Level II
BS-M101.CO3	Analyze of physical or engineering problems.	Analyze	Level IV
BS-M101.CO4	Acquire problem solving skills related to engineering science.	Acquire	Level II
BS-M101.CO5	Apply Calculus and Linear Algebra in real life problems.	Apply	Level III
BS-M101.CO6	Classify ensembles and differentiate between Calculus and Linear Algebra.	Classify	Level IV

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	2
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	1
CO3	3	3	3	2	-	-	-	-	-	-	-	3	2	1
CO4	3	1	2	1	-	-	-	-	-	-	1	3	2	2
CO5	2	2	2	2	-	-	-	-	-	-	2	3	1	-
CO6	3	2	2	2	-	-	-	-	-	-	2	3	-	-
AVG.	2.83	2.33	2.5	2.33	0	0	0	0	0	0	1.6667	3	2	1.5

Course Title: Physics-I	Code: BS-PH101
Type of Course: Theory	Course Designation: Compulsory
Semester: 1st	Contact Hours: 3L+1T/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

Course Outcomes	Details	Action Verb	Knowledge Level
BS-PH101.CO1	Apply basic concepts of mechanics	Apply	K3
BS-PH101.CO2	Discuss Physical optics and analyze principles of lasers with applications	Discuss	K6
BS-PH101.CO3	Categorize di electric and magnetic properties of materials leading to Electromagnetic laws	Categorize	K4
BS-PH101.CO4	Differentiate between Classical Physics and Quantum Physics by introducing Planck's law	Differentiate	K5
BS-PH101.CO5	Apply wave particle duality in real life problems followed by simple quantum mechanics calculations	Apply	K3
BS-PH101.CO6	Classify ensembles and differentiate between classical and Quantum statistical mechanics	Classify	K4

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO5	1	3	2	0	-	-	-	-	-	-	-	-	-	-
CO6	-	1	3	2	-	-	-	-	-	-	-	-	-	-
AVG.	1.80	2.33	1.83	1.00	0	0	0	0	0	0	0	0	0	0

Course Title: Basic Electrical Engineering	Code: ES-EE101
Type Of Course: Theory	Course Designation: Compulsory
Semester: 1st	Contact Hours: 3L+1T/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-EE101.CO1	Understand and analyze basic electric and magnetic circuits.	Understand	K2
ES-EE101.CO2	Study the working principles of electrical machines and power converters.	Study	K1
ES-EE101.CO3	Introduce the components of low voltage electrical installations.	Introduce	K1
ES-EE101.CO4	Understand the general structure of electrical power system.	Understand	K2
ES-EE101.CO5	Understand the construction and operation of single-phase transformer.	Understand	K2
ES-EE101.CO6	Explain the working principle of power converters.	Explain	K2

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO2	2	3	3	2	2	-	-	-	-	-	-	-	-	-
CO3	2	-	3	1	-	-	-	-	-	-	-	1	-	-
CO4	2	-	2	2	3	-	-	-	-	-	-	2	-	-
CO5	2	2	-	2	3	-	-	-	-	-	-	1	-	-
CO6	2	1	3	3	3	-	-	-	-	-	-	1	-	-
AVG.	2.17	2	2.75	2	2.6	0	0	0	0	0	0	1.25	0	0

SEMESTER – I
PRACTICAL

Course Title: Physics-I Laboratory	Code: BS-PH191
Type of Course: Practical	Course Designation: Compulsory
Semester: 1^{st}	Contact Hours: 3P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-PH191.CO1	Observe and read data in slide calliper's, screw gauge. Calculate different modulus of elasticity to apply basic knowledge Physics of Elasticity and apply viscosity principle of streamline motion of water to calculate its viscosity coefficient required in fluid mechanics	Observe	K1
BS-PH191.CO2	Arrange sequential connection in electrical experiment to verify principles of Kirchhoff's law to verify passive elements of electrical circuit	Arrange	K3
BS-PH191.CO3	Operate optical instruments to illustrate physical properties of light and to observe spectral lines of light to verify medium specific characteristics. Calculate Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant	Operate	K3
BS-PH191.CO4	Determine Band Gap and Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors. Determine the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.	Determine	K5
BS-PH191.CO5	Apply concepts of quantum mechanics to verify Bohr's atomic orbital theory	Apply	K3
BS-PH191.CO6	Determine Planck's constant and Stefan's constant applying modern Physics	Determine	K5

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PS O2
CO1	2	3	1	1	-	-	-	-	-	-	-	-	-	-
CO2	2	3	1	1	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	1	-	-	-	-	-	-	-	-	-	-
CO4	2	3	1	2	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	1	-	-	-	-	-	-	-	-	-	-
CO6	2	1	3	2	-	-	-	-	-	-	-	-	-	-
AVG.	2	2.33	2	1.33	0	0	0	0	0	0	0	0	0	0

Course Title: Basic Electrical Engineering Lab	Code: ES-EE191
Type of Course: Practical	Course Designation: Compulsory
Semester: 1st	Contact Hours: 2P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-EE191.CO1	Calibrate Ammeter and Wattmeter	Calibrate	**K3**
ES-EE191.CO2	Demonstrate the measuring instrument and electrical machines	Demonstrate	K3
ES-EE191.CO3	Conduct open circuit and short circuit test of single-phase transformer	Conduct	K2
ES-EE191.CO4	Measure 3 phase power using two wattmeters	Measure	**K5**
ES-EE191.CO5	Identify the components of LT switchgear	Identify	K1
ES-EE191.CO6	Understand the characteristic of RLC series and parallel circuit	Understand	K2

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	3	-	-	-	2	-	-	-	-	-
CO2	2	3	3	1	2	-	-	-	3	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	2	-	-	-	-	-
CO4	2	-	2	-	3	-	-	-	3	-	-	-	-	-
CO5	1	-	-	-	1	-	-	-	-	-	-	-	-	-
CO6	2	1	2	1	3	-	-	-	2	-	-	-	-	-
AVG.	1.83	2	2.5	1	2.4	0	0	0	2.4	0	0	0	0	0

Course Title: Workshop	Code: ES-ME192
Type Of Course: Practical	Course Designation: Compulsory
Semester: 1st	Contact Hours: 1L+4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-ME192.CO1	Understanding the applications of hand tools and machine tools.	Understand	K2
ES-ME192.CO2	Comprehend the safety measures required to be taken while using the tools.	Comprehend	K2
ES-ME192.CO3	Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.	Select	K2
ES-ME192.CO4	Fabricate components with their own hands	Fabricate	K6
ES-ME192.CO5	Practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes	Analyze	K6
ES-ME192.CO6	Produce small devices of their interest, by assembling different components,	Produce	K6

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	1	-	1	-	-	-	-	-	-
CO3	1	-	-	-	-	1	-	1	1	-	-	-	-	-
CO4	1	-	-	-	-	-	2	-	2	1	1	-	-	1
CO5	1	-	-	-	-	-	2	-	2	1	1	1	-	-
CO6	1	-	-	-	-	-	2	-	2	1	2	1	-	1
AVG.	1	0	0	0	0	1	2	1	1.75	1	1.33	1	0	1

SEMESTER – II
THEORY

Course Title: Chemistry-I	Code: BS-CH 201
Type of Course: Theory	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 3L+1T/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-CH 201.CO1	Apply first and second law of thermodynamics to different chemical and physical processes under specified condition to determine the equilibrium condition, spontaneity and thermo-chemical behaviour of a reaction.	Apply	K3
BS-CH 201.CO2	Using the concept of conductance of ions analyze the design and working principle of different electrochemical cells.	Use	K3
BS-CH 201.CO3	Derive rate of a reaction at a specified temperature under different medium	Derive	K4
BS-CH 201.CO4	Explain the mechanism considering the structure of the molecules and type of electronic effect present in them.	Explain	K5
BS-CH 201.CO5	Analyze different types of fuels for industrial application.	Analyze	K4
BS-CH 201.CO6	Distinguish different types of polymer for diverse application.	Distinguish	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO5	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO6	3	1	1	1	-	-	-	-	-	-	-	-	-	-
AVG.	3	1.66	1	1	0	0	0	0	0	0	0	0	0	0

Course Title:Mathematics –IIA	**Code: BS-M201**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-M201.CO1	Learn the basic mathematical tools to deal with problems of engineering sciences.	Learn	K1
BS-M201.CO2	Understand properties and application of Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.	Understand	K2
BS-M201.CO3	Analyze of physical or engineering problems.	Analyze	K4
BS-M201.CO4	Acquire problem solving skills related to engineering science.	Acquire	K2
BS-M201.CO5	Apply Linear Algebra, Ordinary Differential Equations (ODE) and Numerical analysis in real life problems.	Apply	K3
BS-M201.CO6	Classify ensembles and differentiate among Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.	Classify	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	-	-	-	-	-	-	-	3	1	-
CO2	2	2	3	1	-	-	-	-	-	-	-	3	2	-
CO3	3	3	3	1	-	-	-	-	-	-	-	3	1	-
CO4	3	2	3	2	-	-	-	-	-	-	1	3	3	1
CO5	3	2	3	2	-	-	-	-	-	-	2	3	3	-1
CO6	3	2	3	2	-	-	-	-	-	-	2	3	3	2
AVG.	2.83	2.17	3	1.5	0	0	0	0	0	0	1.67	3.00	2.17	1.33

Course Title:Programming for ProblemSolving	**Code: ES-CS201**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-CS201.CO1	Analyze the problem and formulate algorithms for them.	Analyze	K4
ES-CS201.CO2	Translate the algorithms to programs (in C language).	Understand	K2
ES-CS201.CO3	Understand the correct syntax of logical expression, branch instruction, iteration,	Understand	K2
ES-CS201.CO4	Apply array and pointer to solve problem.	Apply	K3
ES-CS201.CO5	Understand the use of , function, recursion.	Understand	K2
ES-CS201.CO6	Build analytical skill.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	3	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO4	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	3	3	3	2	1	1	1	1	1	2	2	2.33	2.33

Course Title:English	**Code: HM-HU201**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 2L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HM-HU201.CO1	Understand and apply English Speech Sounds for enhancing English Communication	Understand	K2
HM-HU201.CO2	Apply English Language Presentation Skill in Academic and in Professional Communication	Apply	K3
HM-HU201.CO3	Apply Receptive Skills of English in Academics and in Engineering Profession	Apply	K3
HM-HU201.CO4	Apply Writing Skill of English in Academics and in Profession	Apply	K3
HM-HU201.CO5	Apply Grammar Skill of English in Academic and in Professional Communication	Apply	K3
HM-HU201.CO6	Apply Critical Thinking Skill of English in Academic and in professionional Communication	Apply	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO2	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO3	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO4	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO5	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO6	2	2	2	2	2	2	-	2	-	3	-	2	1	1
AVG.	2	2	2	2	2	2	0	2	0	3	0	2	1	1

SEMESTER – II
PRACTICAL

Course Title:Chemistry-I Laboratory	Code: BS-CH291
Type of Course: Practical	Course Designation: Compulsory
Semester: 2^{nd}	Contact Hours: 3P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-CH291.CO1	Determine some physical parameter like viscosity of a solution and rate constant of a reaction	Determine	K5
BS-CH291.CO2	Determine the strength of an acid using conductometric method.	Determine	K5
BS-CH291.CO3	Determine the strength of an acid using pH metric method.	Determine	K5
BS-CH291.CO4	Determine partition coefficient of a compound	Determine	K5
BS-CH291.CO5	Estimate the amount of an ion present in a given solution using permanganometric and argentometric methods.	Estimate	K5
BS-CH291.CO6	Evaluate alkalinity (in terms of CaCO3 equvalent), hardness (in ppm) and amount of dissolved oxyzen (in mg/l) present in a given water sample using volumetric method.	Evaluate	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO2	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO3	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO4	1	2	2	3	-	-	-	-	-	-	-	-	-	-
CO5	1	2	2	3	-	-	-	-	-	-	-	-	-	-
CO6	1	2	2	3	-	-	-	-	-	-	-	-	-	-
AVG.	1	1.5	2	3	0	0	0	0	0	0	0	0	0	0

Course Title:Programming for ProblemSolving	Code: ES-CS291
Type of Course: Practical	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-CS291.CO1	Analyze the problem and formulate algorithms for them.	Analyze	K4
ES-CS291.CO2	Translate the algorithms to programs (in C language).	Understand	K2
ES-CS291.CO3	Understand the correct syntax of logical expression, branch instruction, iteration,	Understand	K2
ES-CS291.CO4	Apply array and pointer to solve problem.	Apply	K3
ES-CS291.CO5	Understand the use of , function, recursion.	Understand	K2
ES-CS291.CO6	Build analytical skill.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO2	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO3	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO4	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO5	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO6	2	2	2	2	-	-	-	-	-	-	-	2	2	1
AVG.	2	2	2	2	0	0	0	0	0	0	0	2	2	1

Course Title:Engineering Graphics & Design	**Code: ES-ME291**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 1L+4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-ME291.CO1	Understand the applications of hand tools and machine tools.	Understand	K2
ES-ME291.CO2	Comprehend the safety measures required to be taken while using the tools.	Create	K6
ES-ME291.CO3	Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.	Evaluate	K5
ES-ME291.CO4	Fabricate components with their own hands.	Create	K6
ES-ME291.CO5	Confident on practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.	Understand	K2
ES-ME291.CO6	Produce small devices of their interest by assembling different components.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	1	-	1	-	-	-	-	-	-
CO3	1	-	-	-	-	1	-	1	1	-	-	-	-	-
CO4	1	-	-	-	-	-	2	-	2	1	1	-	-	1
CO5	1	-	-	-	-	-	2	-	2	1	1	1	-	-
CO6	1	-	-	-	-	-	2	-	2	1	2	1	-	1
AVG.	1	0	0	0	0	1	2	1	1.75	1	1.333	1	0	1.00

Course Title:Language Laboratory	**Code: HM-HU291**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 2P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HM-HU291.CO1	Understand and apply English Speech Sounds for enhancing English Communication	Understand	K2
HM-HU291.CO2	Apply English Language Presentation Skill in Academic and in Professional Communication	Apply	K3
HM-HU291.CO3	Apply Receptive Skills of English in Academics and in Engineering Profession	Apply	K3
HM-HU291.CO4	Apply Writing Skill of English in Academics and in Profession	Apply	K3
HM-HU291.CO5	Apply Grammar Skill of English in Academic and in Professional Communication	Apply	K3
HM-HU291.CO6	Apply Critical Thinking Skill of English in Academic and in professionional Communication	Apply	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO2	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO3	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO4	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO5	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO6	2	2	2	2	2	2	-	2	1	3	-	2	1	1
AVG.	2	2	2	2	2	2	0	2	1	3	0	2	1	1

SEMESTER – III
THEORY

Course Title:Analog and Digital Electronics	Code: ESC 301
Type of Course: Theory	Course Designation: Compulsory
Semester: 3rd	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ESC 301.CO1	Explain Different Classes of Amplifiers - (Class-A, B, AB and C, power, efficiency; Summarize the basic concepts of Feedback and Oscillation. Demonstrate Phase Shift, Wein Bridge oscillators Astable & Monostable Multivibrators; Schimtt Trigger circuits, 555 Timer.	Explain	K2
ESC 301.CO2	Define the basic concepts of Boolean algebra, binary number system. 1's and 2's complement methods, Binary arithmetic. Define the representation in SOP and POS forms;	Define	K1
ESC 301.CO3	Demonstrate the concept of Minimization of logic using algebraic and k-map. Build various combinational circuits like Adder and Subtractor circuits, Encoder, Decoder, Comparator, Multiplexer, De-Multiplexer and Parity Generator.	Demonstrate	K2
ESC 301.CO4	Explain Sequential Circuits - Basic Flip-flop & Latch, Flip-flops -SR, JK, D, T and JK Master-slave Flip Flops.	Explain	K2
ESC 301.CO5	Build Registers (SISO, SIPO, PIPO, PISO) Ring counter, Johnson counter, Synchronous and Asynchronous counters, Mod N Counter.	Build	K6
ESC 301.CO6	Explain A/D and D/A conversion techniques – Basic concepts (D/A :R-2-R only A/D: successiveapproximation). Explain Logic families- TTL, ECL, MOS and CMOS - basic concepts.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	3	3
CO2	3	3	2	2	-	-	-	-	-	1	-	3	3	3
CO3	3	2	2	2	1	-	-	-	-	1	-	3	3	3
CO4	3	3	3	2	3	-	-	-	-	1	1	3	3	3
CO5	3	3	2	2	2	-	-	-	-	-	2	3	3	3
CO6	3	2	1	1	-	-	-	-	-	-	2	3	3	3
AVG.	3	2.6	2	1.8	2	0	0	0	0	1	1	3	3	3

Course Title:Data Structure & Algorithms	**Code: PCC-CS301**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS301.CO1	Construct algorithms from problems.	Construct	K3
PCC-CS301.CO2	Understand the basics of abstract data types.	Understand	K2
PCC-CS301.CO3	Categorize the property of linear and nonlinear data structures.	Categorize	K4
PCC-CS301.CO4	Learn the use of Tree and graph.	Learn	K3
PCC-CS301.CO5	Compare different shorting and searching methods.	Compare	K5
PCC-CS301.CO6	Learn the use of hashing.	Learn	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	3	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO4	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	3	3	3	2	1	1	1	1	1	2	2.00	2.33	2.33

Course Title:Computer Organisation	Code: PCC-CS302
Type of Course: Theory	Course Designation: Compulsory
Semester: 3rd	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS302.CO1	Illustrate the history of modern computers and the Von Neumann architecture.	Illustrate	K2
PCC-CS302.CO2	Demonstrate basic number systems, Binary numbers, representation of signed and unsigned numbers, Floating point representation.	Demonstrate	K2
PCC-CS302.CO3	Define addressing modes, instruction formats.	Define	K1
PCC-CS302.CO4	Distinguish the organization of various parts of a system memory hierarchy i.e. cache memory , virtual memory etc.	Distinguish	K4
PCC-CS302.CO5	Classify basics of systems topics like, single-cycle (MIPS), multi-cycle (MIPS), parallel, pipelined, superscalar, and RISC/CISC architectures.	Classify	K4
PCC-CS302.CO6	Define different control unit operations and I/O organization.	Define	K1

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	-	-	-	-	3	2
CO2	3	3	3	3	3	-	-	-	-	-	1	-	3	2
CO3	3	3	3	1	3	-	-	-	-	-	2	-	1	3
CO4	3	2	3	3	2	-	-	-	-	-	1	-	2	3
CO5	3	2	3	3	-	-	-	-	-	-	2	2	3	3
CO6	3	3	3	2	3	-	-	-	-	-	3	3	3	3
AVG.	3	2.67	3	2.5	2.6	0	0	0	0	0	1.8	2.5	2.5	2.33

Course Title:Mathematics-III	Code: BSC 301
Type of Course: Theory	Course Designation: Compulsory
Semester: 3^{rd}	Contact Hours: 2L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BSC 301.CO1	Apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines.	Apply	K3
BSC 301.CO2	Learn the tools of power series and Fourier series to analyze engineering problems and apply it to solve different problems by expressing functions in suitable series form.	Learn	K2
BSC 301.CO3	Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points of different surfaces of higher dimensions.	Apply	K3
BSC 301.CO4	Apply the knowledge of double and triple integral in different fields of Engineering to find area, volume and shape of different objects and also to get some physical properties like centre of gravity, moment of inertia, etc.	Apply	K3
BSC 301.CO5	Solve and model many core engineering problems with application of ODE of 1^{st} order and higher order, Simultaneous Linear Differential Equation, Improper Integral and Laplace Transform.	Solve	K3
BSC 301.CO6	Identify and solve different type of graphs and Analyze/Model application of Graph Theory in Information Science.	Identify	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO2	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO3	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO4	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO5	3	2	2	-	-	-	-	-	-	-	-	-	2	1
CO6	3	3	2	1	-	-	-	-	-	-	-	-	2	1
AVG.	3	3	2	1	0	0	0	0	0	0	0	0	2	1

Course Title:Economics for Engineers (Humanities-II)	Code: HSMC 301
Type of Course: Theory	Course Designation: Compulsory
Semester: 3rd	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HSMC 301.CO1	Understand major principles of economic analysis for decision making among alternative courses of action in engineering.	Understand	K2
HSMC 301.CO2	Apply economic principles to prices and quantities in competitive supply and demand for goods and for money.	Apply	K3
HSMC 301.CO3	Solve economic problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis.	Solve	K3
HSMC 301.CO4	Evaluate the effect of inflation,deflation and price change with indexes in Engineering Economic Analysis	Evaluate	K5
HSMC 301.CO5	Analyze the effect of uncertainty in economic analysis by using various concepts like expected value, estimates and simulation	Analyze	K4
HSMC 301.CO6	Understand the concepts of depreciation and replacement analysis andsolve associated problems	Understand	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO2	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO3	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO4	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO5	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO6	2	2	2	2	-	2	-	1	-	-	3	1	1	1
AVG.	2	2	2	2	0	2	0	1	0	0	3	1	1	1

SEMESTER – III
PRACTICAL

Course Title:Analog and Digital Electronics	**Code: ESC 391**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 3^{rd}	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ESC 391.CO1	Understand of the fundamental concepts and techniques used in digital electronics.	Understand	K2
ESC 391.CO2	Understand and examine the structure of various number systems and its application in digital design.	Understand	K2
ESC 391.CO3	Apply the basic requirements for a design application and propose a cost effective solution of various combinational circuits.	Apply	K3
ESC 391.CO4	Analyze basic requirements for a design application and propose a cost effective solution of various sequential circuits.	Analyze	K4
ESC 391.CO5	Identify and prevent various hazards and timing problems in a digital design for developing skill to build, and troubleshoot in digital circuits.	Identify	K3
ESC 391.CO6	Design and examine the structure of analog circuits and verify its operations.	Design	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	1	0	0	-	-	-	1	3	3	3
CO2	3	3	3	1	1	0	0	-	-	1	1	3	3	3
CO3	3	3	3	-	-	0	0	1	-	1	1	3	3	3
CO4	3	3	2	2	1	0	0	1	2	1	1	3	3	3
CO5	3	2	1	-	2	0	0	2	2	1	1	3	3	3
CO6	3	2	2	-	2	0	0	2	2	-	1	3	3	3
AVG.	3	2.67	2.33	1.33	1.4	0	0	1.5	2	1	1	3.00	3.00	3

Course Title:Data Structure & Algorithm Lab	**Code: PCC-CS391**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS391.CO1	Construct algorithms from problems.	Construct	K3
PCC-CS391.CO2	Understand the basics of Stack, Queue.	Understand	K2
PCC-CS391.CO3	Categorize the necessarily of linked list and array implementation.	Categorize	K4
PCC-CS391.CO4	Learn the real life use of Tree and graph.	Learn	K3
PCC-CS391.CO5	Compare different shorting and searching methods.	Compare	K5
PCC-CS391.CO6	Understand the implementation mechanism of shorting and searching.	Understand	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	2	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	2	-	-	-	-	1	1	-	2	2	2
CO4	3	2	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	2	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	2.67	2.83	2.83	2	1	1	1	1	1	2	2	2.33	2.33

Course Title:Computer Organization Lab	Code: PCC-CS392
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS392.CO1	Understand the behaviour of logic gates.	Understand	K2
PCC-CS392.CO2	Design combinational circuits for basic components of computer system and Applications.	Design	K6
PCC-CS392.CO3	Analyze the operational behaviour and applications of various flip-flop.	Analyze	K4
PCC-CS392.CO4	Implement Arithmetic logic units and different types of memory blocks.	Implement	K3
PCC-CS392.CO5	Design to cascade multiple RAM chips for vertical and horizontal expansion.	Design	K6
PCC-CS392.CO6	Implement Carry-Look-Ahead Adder and BCD adder circuit .	Implement	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3	3	1	2	3	3	2	2	3	1
CO2	3	3	1	2	1		1	2	3	3	2	2	-	1
CO3	3	3	2	2	2	1	1	2	2	2	1	3	2	1
CO4	3	3	2	2	2	1	1	2	2	2	2	3	1	3
CO5	3	3	3	2	3	1	1	2	2	2	1	3	-	1
CO6	3	3	3	2	3		1	2	3	3	2	3	3	2
AVG.	3	3	2.33	2	2.3	1.5	1	2	2.5	2.5	1.67	2.67	2.25	1.5

Course Title:IT Workshop	**Code: PCC-CS393**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS393.CO1	Interpret the basic syntax of python variables,datatypes and operator in python and	Interpret	K2
PCC-CS393.CO2	Make use of conditional and control flow statement in python fluently.	Make use of	K3
PCC-CS393.CO3	Define the use of string and list datatype in proficiency level.	Define	K1
PCC-CS393.CO4	Discoverthe method to create and manipulation of python data structure like tuple and dictionary.	Discover	K4
PCC-CS393.CO5	Explain the use of python function and uses of different modules in python.	Explain	K5
PCC-CS393.CO6	Discuss the concepts of object oriented programming like exception handling.	Discuss	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	1	1	1	-	-	1	-	3	3	2
CO2	3	2	1	-	1	1	1	1	-	1	-	2	3	1
CO3	3	3	3	1	3	-	2	-	2	1	1	2	3	2
CO4	3	3	3	1	2	-	-	1	1	-	1	3	2	1
CO5	3	3	3	2	3	-	-	1	2	-	1	3	3	2
CO6	3	3	3	2	3	-	2	2	2	3	1	3	3	2
AVG.	3	2.83	2.5	1.5	2.17	1	1.5	1.25	1.75	1.5	1	2.67	2.83	1.67

SEMESTER – IV
THEORY

Course Title:Discrete Mathematics	**Code: PCC-CS401**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS401.CO1	Define fundamental mathematical concepts such as sets, relations, functions, and integers.	Define	K1
PCC-CS401.CO2	Demonstrate induction hypotheses and simple induction proofs.	Demonstrate	K2
PCC-CS401.CO3	Solve numbers of possible outcomes of elementary combinatorial processes such as permutations and combinations.	Solve	K3
PCC-CS401.CO4	Explain a logic sentence in terms of predicates, quantifiers, and logical connectives.	Explain	K2
PCC-CS401.CO5	Classify algebraic structure for a given mathematical problem.	Classify	K4
PCC-CS401.CO6	Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction.	Apply	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	2	2	-	-	-	-	-	3	-	1
CO2	3	3	-	-	3	3	-	-	-	-	-	3	-	1
CO3	3	3	3	2	3	-	-	-	-	-	-	3	1	1
CO4	3	3	1	3	2	2	-	-	-	-	-	3	2	2
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO6	3	3	3	3	3	2	-	-	-	-	-	3	3	3
AVG.	3	3	2.5	2.75	2.6	2.25	0	0	0	0	0	3.00	2.25	1.84

Course Title:Computer Architecture	**Code: PCC-CS402**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS402.CO1	Understand The basic of Computer architecture	Understand	K2
PCC-CS402.CO2	Discuss the Pipelining technique of Computer architecture	Discuss	K6
PCC-CS402.CO3	Illustrate Different memory management technology	Illustrate	K2
PCC-CS402.CO4	Develop The Instruction level parallelism	Develop	K3
PCC-CS402.CO5	Analyze array and vector processors.	Analyze	K4
PCC-CS402.CO6	Explain the multiprocessor architecture and different taxonomy	Explain	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	2	3
CO2	2	2	2	1	-	-	-	-	-	-	-	-	3	3
CO3	1	-	2	2	1	-	1	-	-	-	-	-	3	2
CO4	-	3	2	-	1	-	-	-	-	-	-	-	3	2
CO5	-	1	3	-	2	1	-	-	-	-	-	1	2	3
CO6	-	2	2	1	2	1	1	1	-	1	-	-	2	2
AVG.	1.67	2	2.2	1.33	1.5	1	1	1	0	1	0	1.00	2.50	2.5

Course Title: Formal Language & Automata Theory	Code: PCC-CS403
Type of Course: Theory	Course Designation: Compulsory
Semester: 4th	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Course Coordinator :	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS403.CO1	Write a formal notation for strings, languages and machines.	Write	K6
PCC-CS403.CO2	Design finite automata to accept a set of strings of a language.	Design	K6
PCC-CS403.CO3	For a given language determine whether the given language is regular or not	Determine	K5
PCC-CS403.CO4	Design context free grammars to generate strings of context free language.	Design	K6
PCC-CS403.CO5	Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars	Determine	K5
PCC-CS403.CO6	Write the hierarchy of formal languages, grammars and machines and Distinguish between computability and non-computability and Decidability and undecidability	Write	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	-	-	3	3	2
CO2	3	3	2	2	2	-	-	-	-	-	-	3	3	2
CO3	3	1	2	2	2	-	-	-	-	-	-	3	2	2
CO4	3	2	2	2	3	-	-	-	-	-	1	3	2	3
CO5	3	3	2	2	3	-	-	-	-	-	2	3	2	2
CO6	3	3	2	2	3	-	-	-	-	-	2	3	2	2
AVG.	3	2.5	2.17	2	2.5	0	0	0	0	0	1.67	3	2.33	2.17

Course Title: Design and Analysis of Algorithms	**Code: PCC-CS404**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS404.CO1	Analyse the complexities of different algorithms.	Analyze	K4
PCC-CS404.CO2	Develop the algorithm techniques (example Divide & Conquer, Dynamic Programming etc) to solve different mathematical models.	Develop	K3
PCC-CS404.CO3	Illustrate the techniques of Greedy paradigm, Branch and Bound, Backtracking etc and compare and contrast them.	Illustrate	K2
PCC-CS404.CO4	Discuss the types of Minimal spanning tree and traversal algorithm with their applications.	Discuss	K6
PCC-CS404.CO5	Understand the variations among tractable and intractable problems to introduce polynomial and non-polynomial reduction.	Understand	K2
PCC-CS404.CO6	Explain the randomized algorithms and approximation algorithms to illustrate their applications.	Explain	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO3	3	3	3	3	2	-	-	-	-	-	-	-	3	1
CO4	3	3	3	2	2	-	-	-	-	-	-	-	3	2
CO5	3	3	3	1	1	-	2	-	-	-	-	-	2	3
CO6	3	3	3	2	2	2	1	-	-	-	-	-	2	3
AVG.	3	2.83	3	2	1.75	2	1.5	0	0	0	0	0	2.67	2.25

Course Title: Biology	Code: BSC 401
Type of Course: Theory	Course Designation: Compulsory
Semester: 4th	Contact Hours: 2L+1T/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Course Coordinator :	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BSC 401.CO1	Describe with examples the biological observations lead to major discoveries	Describe	K1
BSC 401.CO2	Explain the classification of kingdom and building blocks of life, classification at cellular, energy and excretory level, habitat, study of model organisms, explain techniques of biophysics to study biological phenomena, cancer diagnosis and treatment.	Explain	K2
BSC 401CO3	Identify DNA as genetic material in the molecular basis of information transfer	Identify	K3
BSC 401.CO4	Analyze biological processes at the reductionistic level.	Analyze	K4
BSC 401.CO5	Apply thermodynamic principles to biological systems.	Apply	K3
BSC 401.CO6	Identify microorganism	Identify	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	1	1	-	-	1	-	-	-	-	-	-	-	-
CO2	-	2	2	-	-	2	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO4	-	-	1	-	-	1	-	-	-	-	-	-	-	-
CO5	-	-	1	-	-	1	-	-	-	-	-	-	-	-
CO6	-	1	2	-	-	1	-	-	-	-	-	-	-	-
AVG.	0	1.33	1.4	0	0	1.16	0	0	0	0	0	0	0	0

Course Title: Environmental Sciences	Code: MC-401
Type of Course: Theory	Course Designation: Compulsory
Semester: 4th	Contact Hours: 1L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Course Coordinator :	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BSC 401.CO1	Resolve different open-ended problems related to air pollution acquiring the detailed knowledge about source, effect and mechanism of the pollution.	Resolve	K3
BSC 401.CO2	Solve various societal problems related to land pollution after detailed understanding about source, effect and mechanism of the pollution	Solve	K3
BSC 401CO3	Conceive the basic of the need of natural resource management, environmental protection and population control. Extend the knowledge as well as the consciousness related to environmental issues to the society considering the related laws, acts and legislations	Conceive	K2
BSC 401.CO4	Acquire skills for scientific problem-solving related to air, water, noise& land pollution.	Acquire	K1
BSC 401.CO5	Determine the issues related to noise pollution after studying the existing situation in detail.	Determine	K5
BSC 401.CO6	Develop awareness about the geographical feature of the country considering biodiversity and the variety of ecological systems present in the nature.	Develop	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	1	-	-	1	2	-	-	-	-	-	-	-
CO2	-	2	1	-	-	1	2	-	-	-	-	-	-	-
CO3	-	2	2	-	-	2	1	-	-	-	-	-	-	-
CO4	-	2	1	-	-	1	2	-	-	-	-	-	-	-
CO5	-	2	1	-	-	1	2	-	-	-	-	-	-	-
CO6	-	1	1	-	-	1	1	-	-	-	-	-	-	-
AVG.	0	1.83	1.17	0	0	1.17	1.67	0	0	0	0	0	0	0

SEMESTER – IV

PRACTICAL

Course Title: Computer Architecture Lab	**Code: PCC-CS492**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS492.CO1	Discuss the various logic gates using the VHDL programming language.	Discuss	K6
PCC-CS492.CO2	Understanding the arithmetic operations of n- bit numbers using VHDL.	Understand	K2
PCC-CS492.CO3	Analyzing the synthesis of different combinational circuits using VHDL.	Analyze	K4
PCC-CS492.CO4	Illustrate the synthesis of the different sequential circuits using VHDL.	Illustrate	K2
PCC-CS492.CO5	Explain the construction of different memory elements using VHDL.	Explain	K5
PCC-CS492.CO6	Develop different processing elements using VHDL.	Develop	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	2	2	1	-	-	0	-	-	-	-	2	3
CO2	2	2	2	1	1	-	-	0	-	-	-	-	2	2
CO3	2	1	2	2	-	-	-	0	1	-	-	-	2	2
CO4	3	3	3	2	-	-	-	0	1	-	-	-	3	2
CO5	3	2	2	1	1	2	2	0	1	-	-	1	2	2
CO6	3	2	3	2	1	2	1	0	1	1	2	2	3	3
AVG.	2.67	2	2.33	1.67	1	2	1.5	0	1	1	2	1.50	2.33	2.33

Course Title: Design & Analysis Algorithm Lab	Code: PCC-CS494
Type of Course: Practical	Course Designation: Compulsory
Semester: 4th	Contact Hours: 4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Course Coordinator :	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS494.CO1	Analyse different types of applications of Divide & Conquer techniques	Analyze	K4
PCC-CS494.CO2	Understanding to implement Dynamic Programming techniques	Understand	K2
PCC-CS494.CO3	Examine to implement knapsack, Job sequencing with deadlines, Prim's and Kruskal's algorithms by using greedy method	Examine	K4
PCC-CS494.CO4	Discuss the implementation of the N-Queen and Graph Coloring Problem by using Backtracking	Discuss	K6
PCC-CS494.CO5	Develop 15 Puzzle problem by using Branch & Bound	Develop	K3
PCC-CS494.CO6	Explain the way of implementation of BFS and DFS by using Graph Traversal Algorithms	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	2
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	1
CO4	3	3	3	1	-	-	-	-	-	-	-	-	3	1
CO5	3	3	3	1	1	-	-	-	-	-	-	-	3	2
CO6	3	3	3	3	2	-	-	1	-	-	-	-	3	3
AVG.	3	3	3	1.67	1.5	0	0	1	0	0	0	0	3	1.8

SEMESTER – V
THEORY

Course Title:Discrete Mathematics	Code:CS503
Type of Course: Theory	Course Designation: Compulsory
Semester: 5th	Contact Hours: 3L+1T/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Course Coordinator :	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS401.CO1	Define fundamental mathematical concepts such as sets, relations, functions, and integers.	Define	K1
PCC-CS401.CO2	Demonstrate induction hypotheses and simple induction proofs.	Demonstrate	K2
PCC-CS401.CO3	Solve numbers of possible outcomes of elementary combinatorial processes such as permutations and combinations.	Solve	K3
PCC-CS401.CO4	Explain a logic sentence in terms of predicates, quantifiers, and logical connectives.	Explain	K2
PCC-CS401.CO5	Classify algebraic structure for a given mathematical problem.	Classify	K4
PCC-CS401.CO6	Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction.	Apply	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	2	2	-	-	-	-	-	3	-	1
CO2	3	3	-	-	3	3	-	-	-	-	-	3	-	1
CO3	3	3	3	2	3	-	-	-	-	-	-	3	1	1
CO4	3	3	1	3	2	2	-	-	-	-	-	3	2	2
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO6	3	3	3	3	3	2	-	-	-	-	-	3	3	3
AVG.	3	3	2.5	2.75	2.6	2.25	0	0	0	0	0	3.00	2.25	1.84

Course Title: Design and Analysis of Algorithms	Code: CS 501
Type of Course: Theory	Course Designation: Compulsory
Semester: 5^{th}	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Course Coordinator :	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS404.CO1	Analyse the complexities of different algorithms.	Analyze	K4
PCC-CS404.CO2	Develop the algorithm techniques (example Divide & Conquer, Dynamic Programming etc) to solve different mathematical models.	Develop	K3
PCC-CS404.CO3	Illustrate the techniques of Greedy paradigm, Branch and Bound, Backtracking etc and compare and contrast them.	Illustrate	K2
PCC-CS404.CO4	Discuss the types of Minimal spanning tree and traversal algorithm with their applications.	Discuss	K6
PCC-CS404.CO5	Understand the variations among tractable and intractable problems to introduce polynomial and non-polynomial reduction.	Understand	K2
PCC-CS404.CO6	Explain the randomized algorithms and approximation algorithms to illustrate their applications.	Explain	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO3	3	3	3	3	2	-	-	-	-	-	-	-	3	1
CO4	3	3	3	2	2	-	-	-	-	-	-	-	3	2
CO5	3	3	3	1	1	-	2	-	-	-	-	-	2	3
CO6	3	3	3	2	2	2	1	-	-	-	-	-	2	3
AVG.	3	2.83	3	2	1.75	2	1.5	0	0	0	0	0	2.67	2.25

Course Title: MicroprMicroprocessors & Microcontrollers	Code:CS502
Type Of Course: Theory	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS502.CO1	Introduction to Microcomputer based system. History of evolution of Microprocessor and Microcontrollers and their advantages and disadvantages.	Demonstrate	K2
CS502.CO2	Address/data bus Demultiplexing , Status Signals and the control signals. Instruction set of 8085 microprocessor, Addressing modes,Timing diagram of the instructions (a few examples)..	Discuss	K6
CS502.CO3	Assembly language programming with examples, Counter and Time Delays, Stack and Subroutine, Interrupts of 8085 processor(software and hardware), I/O Device Interfacing-I/O Mapped I/O and Memory Mapped I/O , Serial (using SID and SOD pins and RIM, SIM Instructions) and Parallel data transfer,	Develop	K3
CS502.CO4	The 8086 microprocessor- Architecture, Addressing modes, Interrupts.Introduction to 8051 Microcontroller –Architecture, Pin Details. Addressing modes, Instruction set, Examples of Simple Assembly Language.	Explain	K5
CS502.CO5	Memory interfacing with 8085, 8086 .Support IC chips- 8255 ,8251,8237/8257,8259.	Analyze	K6
CS502.CO6	Interfacing of 8255 PPI with 8085 and Microcontroller 8051. Brief introduction to PIC microcontroller (16F877)	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	-	2	2	3	2	3	-	2	3	3
CO2	3	2	1	1	2	-	-	3	3	1	1	3	3	2
CO3	3	2	3	1	1	-	-	2	3	2	2	2	3	2
CO4	3	3	3	2	-	-	-	3	3	2	2	2	3	2
CO5	3	2	1	1	3	-	-	2	3	1	2	2	3	2
CO6	3	2	2	1	-	-	-	2	2	-	2	1	3	2
AVG.	3	2	1.83	1.167	2	2	2	2.5	2.667	1.8	1.8	2	3.00	2.17

Course Title: Object Oriented Programming	Code:CS504D
Type of Course: Theory	Course Designation: Compulsory
Semester: 5th	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS503.CO1	Describe classes, objects, members of a class and relationships among them needed for a specific problem.	Describe	K1
PCC-CS503.CO2	Explain the features of object-oriented principles such as encapsulation, polymorphism and composition of systems based on object identity.	Explain	K2
PCC-CS503.CO3	Analyze the concepts of inheritance and its application in OO design with different design patterns.	Analyze	K4
PCC-CS503.CO4	Discuss simple abstract data types and design implementations using abstraction functions to document them.	Discuss	K2
PCC-CS503.CO5	Apply some common object-oriented design patterns and give examples of their use.	Apply	K3
PCC-CS503.CO6	Design applications with an event-driven graphical user interface.	Design	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	2	-	-	-	2	-	-	2	2	2	1
CO2	3	3	1	3	-	-	-	1	-	-	2	2	2	3
CO3	3	3	2	3	-	-	-	3	-	-	2	2	3	2
CO4	3	3	2	3	-	-	-	3	-	-	2	2	3	2
CO5	3	3	-	1	-	-	-	2	2	2	2	2	2	1
CO6	3	3	-	3	-	-	-	3	2	2	2	2	3	2
AVG.	3	3	1.5	2.5	0	0	0	2.33	2	2	2	2	2.5	1.83

Course Title:Economics for Engineers (Humanities-II)	Code: HSMC 301
Type of Course: Theory	Course Designation: Compulsory
Semester: 3rd	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HSMC 301.CO1	Understand major principles of economic analysis for decision making among alternative courses of action in engineering.	Understand	K2
HSMC 301.CO2	Apply economic principles to prices and quantities in competitive supply and demand for goods and for money.	Apply	K3
HSMC 301.CO3	Solve economic problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis.	Solve	K3
HSMC 301.CO4	Evaluate the effect of inflation,deflation and price change with indexes in Engineering Economic Analysis	Evaluate	K5
HSMC 301.CO5	Analyze the effect of uncertainty in economic analysis by using various concepts like expected value, estimates and simulation	Analyze	K4
HSMC 301.CO6	Understand the concepts of depreciation and replacement analysis andsolve associated problems	Understand	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO2	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO3	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO4	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO5	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO6	2	2	2	2	-	2	-	1	-	-	3	1	1	1
AVG.	2	2	2	2	0	2	0	1	0	0	3	1	1	1

SEMESTER – V

PRACTICAL

Course Title: Design & Analysis Algorithm Lab	**Code: PCC-CS494**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS494.CO1	Analyse different types of applications of Divide & Conquer techniques	Analyze	K4
PCC-CS494.CO2	Understanding to implement Dynamic Programming techniques	Understand	K2
PCC-CS494.CO3	Examine to implement knapsack, Job sequencing with deadlines, Prim's and Kruskal's algorithms by using greedy method	Examine	K4
PCC-CS494.CO4	Discuss the implementation of the N-Queen and Graph Coloring Problem by using Backtracking	Discuss	K6
PCC-CS494.CO5	Develop 15 Puzzle problem by using Branch & Bound	Develop	K3
PCC-CS494.CO6	Explain the way of implementation of BFS and DFS by using Graph Traversal Algorithms	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	2
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	1
CO4	3	3	3	1	-	-	-	-	-	-	-	-	3	1
CO5	3	3	3	1	1	-	-	-	-	-	-	-	3	2
CO6	3	3	3	3	2	-	-	1	-	-	-	-	3	3
AVG.	3	3	3	1.67	1.5	0	0	1	0	0	0	0	3	1.8

Course Title: Microprocessor & Microcontroller Lab	**Code:** CS592
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS592.**CO1**	Study of Prewritten programs on 8085 trainer kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical).	Analyze	K4
CS592.**CO2**	Familiarization with 8085 simulator on PC. Programs using basic instruction set (data transfer, Load/Store, Arithmetic, Logical) on the simulator.	Understand	K2
CS592.**CO3**	Table look up Copying a block of memory Shifting a block of memory Packing and unpacking of BCD number	Examine	K4
CS592.**CO4**	Addition of BCD numbers Binary to ASCII conversion and vice-versa (Using Subroutine Call) BCD to Binary Conversion and vice-versa String Matching, Multiplication	Discuss	K6
CS592.**CO5**	Program using IN/OUT instructions and 8255 PPI on the trainer kit e.g. subroutine for delay, x. Glowing all the LEDs one by one with particular delay xi. Reading switch state and glowing LEDs accordingly	Develop	K3
CS592.**CO6**	Serial communication between two trainer kits	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	2
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	1
CO4	3	3	3	1	-	-	-	-	-	-	-	-	3	1
CO5	3	3	3	1	1	-	-	-	-	-	-	-	3	2
CO6	3	3	3	3	2	-	-	1	-	-	-	-	3	3
AVG.	3	3	3	1.67	1.5	0	0	1	0	0	0	0	3	1.8

Course Title: Object Oriented Programming Lab	**Code: PCC-CS593**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PCC-CS593.CO1	Define an object oriented programming language, and associated class libraries and learn how to develop object oriented programs.	Define	K1
PCC-CS593.CO2	Understand the concepts of class, constructor, data encapsulation, inheritance, overriding and polymorphism to describe large scale software.	Understand	K2
PCC-CS593.CO3	Develop and debug programs using object oriented principles with wrapper class, arrays.	Develop	K3
PCC-CS593.CO4	Apply the concept of interfaces- multiple inheritance, extending interfaces.	Apply	K3
PCC-CS593.CO5	Analyze and use an integrated environment development by creating and accessing packages and multithreaded programming	Analyze	K4
PCC-CS593.CO6	Develop programs with Graphical User Interfaces capabilities and solve related problems.	Develop	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	2	-	-	-	2	-	-	2	2	1
CO2	3	3	3	1	3	-	-	-	1	-	-	2	2	3
CO3	3	3	3	2	3	-	-	-	3	-	-	2	3	2
CO4	3	3	3	2	3	-	-	-	3	-	-	2	3	2
CO5	3	3	3	-	1	-	-	-	2	2	2	2	2	1
CO6	3	3	3	-	3	-	-	-	3	2	2	2	3	2
AVG.	3	3	3	1.5	2.5	0	0	0	2.3	2	2	2	2.5	1.8

SEMESTER – VI

THEORY

Course Title: Database Management Systems	**Code: CS601**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS601.CO1	Describe the basic concept of database and different database models along with database languages like DDL, DML etc, Data Abstraction, and Data Independence.	Describe	K1
CS601.CO2	Identify different approaches for solving queries such as Relational algebra, Tuple and domain relational calculus, considering the query optimization strategies, and different normal forms for relational database normalization.	Identify	K3
CS601.CO3	Evaluate the applications of different storage strategies such as Indices, B-trees, hashing	Evaluate	K5
CS601.CO4	Understand the transaction processing and concurrency control strategies including ACID property, serializability of scheduling, locking and timestamp based schedulers, Database recovery.	Understand	K2
CS601.CO5	Analyze the database security approaches including authentication, authorization and access control, DAC, MAC and RBAC models, intrusion detection, SQL injection etc.	Analyze	K4
CS601.CO6	Explain the advanced concepts related to DBMS such as object oriented and object relational databases, logical databases, web databases, distributed databases, data warehousing and data mining.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	1	1	-	-	-	-	-	-	1	2	-
CO2	2	-	2	2	-	-	1	-	-	-	-	-	2	-
CO3	-	2	2	2	2	-	-	2	-	-	1	-	3	1
CO4	1	3	3	1	2	-	-	-	-	-	-	-	3	2
CO5	1	2	-	2	1	-	-	-	-	-	2	-	2	-
CO6	2	2	2	2	2	3	-	-	-	-	-	-	2	1
AVG.	1.6	2.2	2.2	1.6	1.6	3	1	2	0	0	1.5	1.00	2.33	1.33

Course Title: Operating Systems	**Code:CS603**
Type Of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS603.CO1	Demonstrate the concepts of Operating System Services, System calls, structure and types.	Demonstrate	K2
CS603.CO2	Discuss processes and threads for multiprogramming and multi-threading.	Discuss	K6
CS603.CO3	Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response	Develop	K3
CS603.CO4	Explain algorithmic solutions to process synchronization problems for Inter-Process communication	Explain	K5
CS603.CO5	Analyse the necessary conditions for Deadlock avoidance and prevention to solve them.	Analyze	K6
CS603.CO6	Explain Memory management, Virtual Memory, I/O Hardware, File and Disk Management system.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	-	2	2	3	2	3	-	2	3	3
CO2	3	2	1	1	2	-	-	3	3	1	1	3	3	2
CO3	3	2	3	1	1	-	-	2	3	2	2	2	3	2
CO4	3	3	3	2	-	-	-	3	3	2	2	2	3	2
CO5	3	2	1	1	3	-	-	2	3	1	2	2	3	2
CO6	3	2	2	1	-	-	-	2	2	-	2	1	3	2
AVG.	3	2	1.83	1.167	2	2	2	2.5	2.667	1.8	1.8	2	3.00	2.17

Course Title: Computer Networks	Code: CS602
Type of Course: Theory	Course Designation: Compulsory
Semester: 6^{th}	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS602.CO1	Describe the fundamental concepts of computer networking, Data Communications System and learn its components.	Describe	K1
CS602.CO2	Explain the concept of function(s) of each layer of the OSI model and learn about TCP/IP.	Explain	K2
CS602.CO3	Identify the different types of network topologies, protocols, networking devices and make concepts about their functions within a network.	Identify	K3
CS602.CO4	Simplify building the skills of subnetting and routing mechanisms.	Simplify	K4
CS602.CO5	Justify the different system component parts of the network	Justify	K5
CS602.CO6	Develop an expertise in some specific areas of networking such as the design and learn about maintenance of individual networks	Develop	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	2	2	-	-	-	-	-	-	3	3	2
CO2	3	2	1	2	2	-	-	-	-	-	-	3	3	2
CO3	3	2	-	2	2	-	-	-	-	-	-	3	2	2
CO4	3	3	2	2	3	-	-	-	-	-	1	3	2	3
CO5	2	3	2	2	3	-	-	-	-	-	2	3	2	2
CO6	2	3	2	2	3	-	-	-	-	-	2	3	2	2
AVG.	2.66	2.33	1.75	2	2.5	0	0	0	0	0	1.67	3.00	2.33	2.17

Course Title: Principles of Management	**Code:** HU-601
Type Of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HU-601.**CO1**	Basic concepts of management: Definition – Essence, Functions, Roles, LevelFunctions of Management: Planning – Concept, Nature, Types, Analysis, Management by objectives; Organisation Structure – Concept, Structure, Principles, Centralization, Decentralization, Span of Management; Organisational Effectiveness..	Demonstrate	K2
HU-601.**CO2**	Management and Society – Concept, External Environment, CSR, Corporate Governance, Ethical Standards.	Discuss	K6
HU-601.**CO3**	People Management – Overview, Job design, Recruitment & Selection, Training & Development, Stress Management.	Develop	K3
HU-601.**CO4**	Managerial Competencies – Communication, Motivation,	Explain	K5
HU-601.**CO5**	Team Effectiveness, Conflict Management, Creativity, Entrepreneurship	Analyze	K6
HU-601.**CO6**	Leadership: Concept, Nature, Styles. Decision making: Concept, Nature, Process, Tools & techniquesEconomic, Financial & Quantitative Analysis – Production, Markets, National Income Accounting, Financial Function & Goals, Financial Statement & Ratio Analysis	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	-	2	2	3	2	3	-	2	3	3
CO2	3	2	1	1	2	-	-	3	3	1	1	3	3	2
CO3	3	2	3	1	1	-	-	2	3	2	2	2	3	2
CO4	3	3	3	2	-	-	-	3	3	2	2	2	3	2
CO5	3	2	1	1	3	-	-	2	3	1	2	2	3	2
CO6	3	2	2	1	-	-	-	2	2	-	2	1	3	2
AVG.	3	2	1.83	1.167	2	2	2	2.5	2.667	1.8	1.8	2	3.00	2.17

Course Title: Multimedia Technology	Code: CS 605C
Type of Course: Theory	Course Designation: Elective
Semester: 6th	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS 605C.CO1	Learn technical aspect of Multimedia Systems	Learn	K1
CS 605C.CO2	Understand the standards available for different audio,video Image and text applications	Understand	K2
CS 605C.CO3	Design various available storage model for multimedia and can give a comparison study between them	Design	K6
CS 605C.CO4	Compare between different available multimedia document architecture	Compare	K4
CS 605C.CO5	Explain technical aspects of popular multimedia web applications, including VoD and VoIP	Explain	K2
CS 605C.CO6	Develop multimedia application and analyze the performance of the same	Develop	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
CO2	-	-	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	2	1	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	1	-	-	-	-	-	-	-	1	-
CO5	-	-	-	2	1	-	-	-	-	-	-	-	1	-
CO6	-	-	3	2	1	-	-	-	-	-	-	-	1	2
AVG.	0	0	3	2	1	0	0	0	0	0	0	0	1	1.5

Course Title: Computer Graphics	**Code:** CS604B
Type of Course: Theory	**Course Designation: Elective**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS604B.**CO1**	Introduction to computer graphics & graphics systems Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations;	Learn	K1
CS604B.**CO2**	Visualization & image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software.	Understand	K2
CS604B.**CO3**	2D transformation & viewing Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, transformations between coordinate systems	Design	K6
CS604B.**CO4**	3D transformation & viewing 3D transformations: translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, view port clipping, 3D viewing.	Compare	K4
CS604B.**CO5**	Hidden surfaces Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Painter's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods , fractal - geometry	Explain	K2
CS604B.**CO6**	Color & shading models Light & color model; interpolative shading model; Texture. Introduction to Ray-tracing:	Develop	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
CO2	-	-	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	2	1	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	1	-	-	-	-	-	-	-	1	-
CO5	-	-	-	2	1	-	-	-	-	-	-	-	1	-
CO6	-	-	3	2	1	-	-	-	-	-	-	-	1	2
AVG.	0	0	3	2	1	0	0	0	0	0	0	0	1	1.5

PRACTICAL

Course Title: Database Management System Lab	Code: CS691
Type of Course: Practical	Course Designation: Compulsory
Semester: 6th	Contact Hours: 4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS691.CO1	Analyze and transform an Entity Relationship Model into a relational database schema and to use a data definition language to implement the schema using a DBMS	Analyze	K4
CS691.CO2	Declare and enforce integrity constraints on a database using a DBMS	Declare	K1
CS691.CO3	Populate and query a database using SQL DML/DDL commands.	Populate	K3
CS691.CO4	Retrieve of data from a database.	Retrieve	K3
CS691.CO5	Describe and implement relational algebra expression using aggregate functions, joins and sub-queries.	Describe	K1
CS691.CO6	Compile programs in PL/SQL including stored procedures, stored functions, cursors, packages.	Compile	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	3	1	-	1	2	-	1	2	2	1
CO2	3	2	3	2	3	1	-	-	2	-	1	2	2	1
CO3	3	2	3	2	3	1	-	2	2	-	1	2	2	1

CO4	3	2	3	2	3	1	-	2	2	-	1	2	2	1
CO5	3	2	3	3	3	1	-	2	2	-	1	2	2	1
CO6	3	2	3	2	3	1	-	2	2	-	1	2	2	1
AVG.	3	2	3	3	3	1	0	1.8	2	0	1	2	2	1

Course Title: Computer Networks Lab	**Code: CS692**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS692.CO1	Describe the Networking cables (CAT5, UTP), Connectors (RJ45, T-connector) and installation of Network Interface Card .	Describe	K1
CS692.CO2	Explain the working and difference of various networking devices like Hub, Bridge, Network Switch, Router and Modem.	Explain	K2
CS692.CO3	Developed a client server socket programming using TCP and UDP approach in C and Java.	Develop	K3
CS692.CO4	Generate techniques Data link Layer Flow control mechanisms like Stop &Wait and Sliding Window using C.	Generate	K4
CS692.CO5	Explain how to implement Data Link Layer Error Detection Mechanism (Cyclic Redundancy Check) and error control mechanism like Selective Repeat and GoBack-N algorithm using C.	Explain	K5
CS692.CO6	Create the server setup configuration using different process like FTP, DNS, TelNet,NFS and concept of Firewall.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	-	3	-	-	-	2	-	3	-	3	3
CO2	3	2	3	-	3	-	-	-	0	-	3	-	3	1
CO3	3	2	3	-	3	-	-	-	2	-	3	3	3	1
CO4	3	2	3	-	3	-	-	-	2	-	3	3	3	2
CO5	3	2	3	-	3	-	-	-	0	-	3	0	3	3
CO6	3	2	3	-	3	-	-	-	3	-	3	3	3	3
AVG.	3	2	3	0	3	0	0	0	2.25	0	3	3	3	2.17

Course Title: Operating System Lab	**Code: CS692**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS692.CO1	Understanding of different Unix/Linux commands and shell programming	Understand	K2
CS692.CO2	Demonstrate the creation of processes and POSIX threads.	Demonstrate	K3
CS692.CO3	Develop the problems of process scheduling and process synchronization (Signal and Semaphore)	Develop	K6
CS692.CO4	Determine the deadlock avoidance and detection algorithms.	Determine	K5
CS692.CO5	Analyse different Memory allocation and File accessing techniques	Analyse	K4
CS692.CO6	Illustrate Inter-Process Communication through system calls.	Illustrate	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	1	-	-	-	-	-	-	1	3	3
CO2	3	3	3	2	3	-	-	2	-	-	-	2	3	1
CO3	3	3	3	2	3	-	-	2	1	-	-	2	3	2
CO4	3	3	3	2	3	-	-	2	-	-	1	2	3	3
CO5	3	3	3	2	3	-	-	1	1	-	1	2	3	3
CO6	3	3	2	1	1	-	-	-	1	-	-	1	3	3
AVG.	3.00	3.00	2.83	1.67	2.33	0	0	1.75	1.00	0	1.00	1.67	3.00	2.50

SEMESTER – VII

THEORY

Course Title: Machine Learning	**Code: PEC-CS701E**
Type of Course: Theory	**Course Designation: Elective**
Semester: 7th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PEC-CS701E.CO1	Explain the basic concepts of Regression/ Classification. Extend the concepts of statistical learning theory of various Regression/ Classification methods.	Explain	K2
PEC-CS701E.CO2	Analyze the linear discriminant, logistic regression, non-linear SVM, Kernel methods.	Analyze	K4
PEC-CS701E.CO3	Analyze the varoius concepts of unsupervised learning, Generative Models (mixture models and latent factor models) , Dimension reduction, Kernel PCA, Matrix factorization.	Analyze	K4
PEC-CS701E.CO4	Explain Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning	Explain	K2
PEC-CS701E.CO5	Evaluate Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests)	Evaluate	K5
PEC-CS701E.CO6	Explain the concepts of Scalable Machine Learning (Online and Distributed Learning), Inference in Graphical Models, Introduction to Bayesian Learning and Inference, the recent trends in various learning techniques of machine learning and classification methods.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	-	-	-	2	-	-	3	3	3
CO2	3	3	2	3	3	-	-	-	2	1	-	3	3	3
CO3	3	2	2	3	3	-	-	-	2	1	-	3	3	3
CO4	3	3	3	3	3	-	-	-	2	1	-	3	3	3
CO5	2	2	2	2	3	-	-	-	1	-	-	3	3	3
CO6	3	1	1	1	-	-	-	-	1	-	-	3	3	3
AVG.	2.83	2.33	2.167	2.5	3	0	0	0	1.67	1	0	3	3	3

Course Title: Soft Computing	Code: PEC-CS702B
Type of Course: Theory	Course Designation: Elective
Semester: 7th	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PEC-CS702B.CO1	Describe the basic concepts of soft computing; fuzzy sets and fuzzy logic systems, artificial neural network and Genetic Algorithm.	Describe	K1
PEC-CS702B.CO2	Explain Fuzzy sets and Fuzzy logic systems including relationship between the Classical Sets and Fuzzy Sets, Membership functions, fuzzification and defuzzification methods, Fuzzy Inference System and Applications of Fuzzy Logic.	Explain	K2
PEC-CS702B.CO3	Analyze the different Learning Methods and Neural Network models and Competitive learning networks	Analyze	K4
PEC-CS702B.CO4	Understand the components of GA, crossover and mutation, Multi-objective Genetic Algorithm (MOGA).	Understand	K2
PEC-CS702B.CO5	Apply the soft computing techniques such as fuzzy logic, neural network and genetic algorithm in different problem domains.	Apply	K3
PEC-CS702B.CO6	Evaluate other popular soft computing techniques such as Simulated Annealing, Tabu search, Ant colony optimization (ACO), Particle Swarm Optimization (PSO).	Evaluate	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	2	-	-	-	-	-	-	2	2	2
CO2	3	3	2	3	2	-	-	-	-	-	-	1	2	2
CO3	3	3	2	3	2	-	-	-	-	-	-	2	2	2
CO4	3	3	2	3	2	-	-	-	-	-	-	2	2	2
CO5	3	3	2	3	2	-	-	-	-	-	-	1	2	2
CO6	3	3	2	3	2	-	-	-	-	-	-	1	2	2
AVG.	3	3	2	3	2	0	0	0	0	0	0	1.5	2	2

Course Title: Adhoc –Sensor Network	Code: PEC-CS702C
Type of Course: Theory	Course Designation: Elective
Semester: 7th	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PEC-CS702C.CO1	Discuss the wireless network and MANET.	Discuss	K6
PEC-CS702C.CO2	Understand the sensor node architecture	Understand	K2
PEC-CS702C.CO3	Illustrate the different Communication protocol for WSN	Illustrate	K2
PEC-CS702C.CO4	Analyze the routing protocol for WSN	Analyze	K4
PEC-CS702C.CO5	Develop the topology control for WSN	Develop	K3
PEC-CS702C.CO6	Explain the mote architecture OS used in WSN	Explain	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	-	-	3	3	2
CO2	3	3	2	2	2	-	-	-	-	-	-	3	3	2
CO3	3	1	2	2	2	-	-	-	-	-	-	3	2	2
CO4	3	2	2	2	3	-	-	-	-	-	1	3	2	3
CO5	3	3	2	2	3	-	-	-	-	-	2	3	2	2
CO6	3	3	2	2	3	-	-	-	-	-	2	3	2	2
AVG.	3	2.5	2.17	2	2.5	0	0	0	0	0	1.67	3	2.33	2.17

Course Title: Operation Research	Code: OEC-CS701A
Type of Course: Theory	Course Designation: Elective
Semester: 7th	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
OEC-CS701A.CO1	Describe the basic concept of linear programming problem and various component of LPP formulation for solving Business Problems.	Describe	K1
OEC-CS701A.CO2	Identify different approaches for solving LPP problems such as Graphical Method, Simplex Method, Charnes' Big-M Method, Duality Theory, Transportation Problems and Assignment Problems etc.	Identify	K3
OEC-CS701A.CO3	Evaluate the applications of game theory such as 2-Person Zero-sum Game; Saddle Point; Mini-Max and Maxi-Min Theorems, Games without Saddle Point; Graphical Method; Principle of Dominance etc.	Evaluate	K5
OEC-CS701A.CO4	Understand the terms Feasible Solution, Basic and non- basic Variables, Basic Feasible Solution, Degenerate and Non-degenerate Solution, Convex set and the use of game theory.	Understand	K2
OEC-CS701A.CO5	Analyze different types of algorithms such as Floyd Algorithm, PERT- CPM etc. for Cost Analysis, Crashing, and Resource Allocation.	Analyze	K4
OEC-CS701A.CO6	Explain the concepts of Queuing Theoryalong with the some models such as Axiomatic Derivation of the Arrival & Departure (Poisson Queue), Poisson Queue Models: (M/M/1): (∞ / FIFO) and (M/M/1: N / FIFO) etc.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	1	1	-	-	-	2	-	2	2	2	1
CO2	2	2	-	2	-	-	-	-	2	-	2	-	3	2
CO3	2	2	1	2	1	-	-	-	2	-	2	-	2	1
CO4	1	2	1	2	-	-	-	-	1	-	1	2	2	1
CO5	1	2	-	2	-	-	-	-	1	-	2	-	3	2
CO6	1	1	-	1	-	-	-	-	-	-	1	-	2	-
AVG.	1.5	1.83	1	1.67	1	0	0	0	1.6	0	1.67	2	2.33	1.4

Course Title: Multimedia Technology	Code: OEC-CS701B
Type of Course: Theory	Course Designation: Elective
Semester: 7th	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
OEC-CS701B.CO1	Learn technical aspect of Multimedia Systems	Learn	K1
OEC-CS701B.CO2	Understand the standards available for different audio,video Image and text applications	Understand	K2
OEC-CS701B.CO3	Design various available storage model for multimedia and can give a comparison study between them	Design	K6
OEC-CS701B.CO4	Compare between different available multimedia document architecture	Compare	K4
OEC-CS701B.CO5	Explain technical aspects of popular multimedia web applications, including VoD and VoIP	Explain	K2
OEC-CS701B.CO6	Develop multimedia application and analyze the performance of the same	Develop	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
CO2	-	-	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	2	1	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	1	-	-	-	-	-	-	-	1	-
CO5	-	-	-	2	1	-	-	-	-	-	-	-	1	-
CO6	-	-	3	2	1	-	-	-	-	-	-	-	1	2
AVG.	0	0	3	2	1	0	0	0	0	0	0	0	1	1.5

Course Title: Project Management and Entrepreneurship	Code: HSMC 701
Type of Course: Theory	Course Designation: Compulsory
Semester: 7th	Contact Hours: 2L+1T/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HSMC 701.CO1	Examine role of entrepreneur in economic development	Examine	K3
HSMC 701.CO2	Describe the steps to establish an enterprise	Describe	K1
HSMC 701.CO3	Compare and classify types of entrepreneurs	Compare	K4
HSMC 701.CO4	Evaluate the entrepreneurial support in India	Evaluate	K5
HSMC 701.CO5	Describe Special institutions for entrepreneurial development and assistance in India	Describe	K1
HSMC 701.CO6	Explain project Identification	Explain	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	-	-	-	3	3	1
CO2	3	3	3	3	3	-	-	-	-	-	-	2	3	2
CO3	3	3	3	1	3	1	1	-	-	-	-	3	3	2
CO4	3	3	3	3		-	-	-	-	-	-	3	3	2
CO5	3	3	3	3	2	-	-	-	-	-	-	3	2	2
CO6	3	3	3	2	3	2	2	-	-	-	1	3	3	3
AVG.	3	3	3	2.5	2.6	1.5	1.5	0	0	0	1	2.83	2.83	2

SEMESTER – VII

Sessional

Course Title: Project-II	**Code: PROJ-CS781**
Type of Course: Sessional	**Course Designation: Compulsory**
Semester: 7th	**Contact Hours: 12P/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PROJ-CS781.CO1	Identify the Problem & Problem Domain in the broad field of Computer Science & Engineering.	Identify	K3
PROJ-CS781.CO2	Understand the Research Methodologies and Field Study	Understand	K2
PROJ-CS781.CO3	Understand the Tools and Techniques used	Understand	K2
PROJ-CS781.CO4	Identify of the Relevant Resources and Data Set	Identify	K3
PROJ-CS781.CO5	Prepare of s/w and h/w requirement analysis	Prepare	K6
PROJ-CS781.CO6	Develop goal in line with flow of work	Develop	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	3	3	3	3	-	-	-	2	2	2	3
CO2	2	3	3	3	1	2	3	-	-	-	-	-	1	3
CO3	2	2	-	2	3		-	-	-	-	-	-	3	1
CO4	2	2	-	2	3	-	-	-	-	-	-	-	2	2
CO5	1	1	1	2	2	-	-	-	-	-	-	-	2	1
CO6	1	1	1	2	-	2	2	2	2	-	2	-	1	2
AVG.	1.66	2	2	2.33	2.4	2.33	2.66	2	2	0	2	2	1.83	2

SEMESTER – VIII

THEORY

Course Title: Cryptography and Network Security	Code: PEC-CS801B
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PEC-CS801B.CO1	Describe conceptual understanding of network security issues, challenges and mechanisms common network vulnerabilities and attacks and basic concept of cryptography.	Describe	K1
PEC-CS801B.CO2	Evaluate various techniques of cryptography.	Evaluate	K5
PEC-CS801B.CO3	Illustrate the algorithms of different key symmetric cryptography.	Illustrate	K2
PEC-CS801B.CO4	Apply the public key algorithms, digital signature and message digest.	Apply	K3
PEC-CS801B.CO5	Analyze the approaches of security protocol and authentication.	Analyze	K4
PEC-CS801B.CO6	Explain the concept of electronic mail security and types of firewall and its configurations.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	1	3	3
CO2	3	3	3	-	2	-	-	-	-	-	-	-	3	2
CO3	2	2	1	2	3	1	-	1	1	3	-	-	3	2
CO4	3	3	2	2	3	1	2	1	0	2	-	-	3	2
CO5	3	2	3	2	1	-	-	-	-	1	-	-	2	2
CO6	3	2	3	2	2	2	-	-	-	-	-	-	2	2
AVG.	2.83	2.5	2.33	2	2.2	1.33	2	1	0.5	2	0	1	2.67	2.167

Course Title: Internet of Things	**Code: PEC-CS801E**
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PEC-CS801E.CO1	Understand the vision of IoT from a global context.	Understand	K2
PEC-CS801E.CO2	Determine the Market perspective of IoT.	Determine	K5
PEC-CS801E.CO3	Use of Devices, Gateways and Data Management in IoT.	Use of	K3
PEC-CS801E.CO4	Analysed the use of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.	Analysed	K4
PEC-CS801E.CO5	Understand the architecture of smart sensor.	Understand	K2
PEC-CS801E.CO6	Build the interfacing among IoT components.	Build	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	3	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO4	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	3	3	3	2	1	1	1	1	1	2	2	2.33	2.33

Course Title: Big Data Analytics	**Code: OEC-CS801A**
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
OEC-CS801A.CO1	Understand Big Data and its Business Implications.	Understand	K2
OEC-CS801A.CO2	Analyze the nonrelational database framework like, NOSQL to efficiently store and process Big Data to generate analytics. Analyze HDFS distributed file system, HADOOP streaming and I/O.	Analyze	K4
OEC-CS801A.CO3	Design of Algorithms to solve Data Intensive Problems using Map Reduce Paradigm, YARN job scheduling and shuffle sort task execution.	Design	K6
OEC-CS801A.CO4	Explain the concepts of Hbase data model, client and implementations. Cassandra data model, Cassandra examples, Cassandra clients, Hadoop integration.	Explain	K2
OEC-CS801A.CO5	Design with Implementation of Big Data Analytics using Apache pig and spark to solve data intensive problems and to generate analytics	Design	K6
OEC-CS801A.CO6	Implement Big Data Activities using Hive.	Implement	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	-	-	3	3	2
CO2	3	3	2	2	2	-	-	-	-	-	-	3	3	2
CO3	3	1	2	2	2	-	-	-	-	-	-	3	2	2
CO4	3	2	2	2	3	-	-	-	-	-	1	3	2	3
CO5	3	3	2	2	3	-	-	-	-	-	2	3	2	2
CO6	3	3	2	2	3	-	-	-	-	-	2	3	2	2
AVG.	3	2.5	2.16667	2	2.5	0	0	0	0	0	1.6667	3	2.33	2.166

Course Title: Mobile Computing	**Code: OEC-CS801C**
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
OEC-CS801C.CO1	Analyze the Personal Communication service and GSM architecture	Analyze	K4
OEC-CS801C.CO2	Develop the concept of GPRS architecture and WLAN standard	Develop	K3
OEC-CS801C.CO3	Illustrate the WLL structure and the concept of WAP protocol.	Illustrate	K2
OEC-CS801C.CO4	Discuss the 3G mobile services	Discuss	K1
OEC-CS801C.CO5	Understand the concept of Global Mobile Satellite Systems and its case studies	Understand	K2
OEC-CS801C.CO6	Explain the Server-side programming in Java and Pervasive web application architecture	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	-	-	3	3	2
CO2	3	3	2	2	2	-	-	-	-	-	-	3	3	2
CO3	3	1	2	2	2	-	-	-	-	-	-	3	2	2
CO4	3	2	2	2	3	-	-	-	-	-	1	3	2	3
CO5	3	3	2	2	3	-	-	-	-	-	2	3	2	2
CO6	3	3	2	2	3	-	-	-	-	-	2	3	2	2
AVG.	3	2.5	2.17	2	2.5	0	0	0	0	0	1.67	3	2.33	2.17

Course Title: E-Commerce & ERP	**Code: OEC-CS802A**
Type of Course: Theory	**Course Designation: Elective**
Semester: 8^{th}	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
OEC-CS802A.CO1	Describe the fundamental concept and scope of E-Commerce, relation between E-Commerce and Networking and their concerned hardware.	Describe	K1
OEC-CS802A.CO2	Explain various business models and E-strategies for developing E-Commerce	Explain	K2
OEC-CS802A.CO3	Understand the role of Conve1rgence, Collaborative Computing, Content Management & Call Center in E-Commerce and Supply Chain Management	Understand	K2
OEC-CS802A.CO4	Analyze the mechanism & security issues related to E-Payment and E-Marketing.	Analyze	K4
OEC-CS802A.CO5	Apply the knowledge of EDI Models and Security Standards in E-Commerce applications.	Apply	K3
OEC-CS802A.CO6	Elaborate the concept of Enterprise Resource Planning using different ERP Packages	Elaborate	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	-	-	1	2	-	-	-	-	1	1	1	1
CO2	1	2	2	1	1	1	-	-	-	-	1	-	2	-
CO3	1	1	1	1	1	-	-	-	-	-	1	-	1	-
CO4	1	1	1	1	1	1	-	-	-	-	1	-	2	1
CO5	1	1	1	1	1	1	-	-	-	-	1	-	2	-
CO6	2	2	2	2	3	2	-	-	1	-	2	1	2	2

AVG.	1.16	1.5	1.4	1.2	1.33	1.4	0	0	1	0	1.16	1	1.66	1.33

SEMESTER – VIII

SESSIONAL

Course Title: Project-III	**Code: PROJ-CS881**
Type of Course: Sessional	**Course Designation: Compulsory**
Semester: 8th	**Contact Hours: 12P/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PROJ-CS881.CO1	Understand the underlying technical concepts and theory.	Understand	K2
PROJ-CS881.CO2	Practice hands on experience to build the basic models	Apply	K3
PROJ-CS881.CO3	Develop mathematical generalize of the solution	Create	K6
PROJ-CS881.CO4	Integrate all the parts and deployment of the project	Apply	K3
PROJ-CS881.CO5	Prepare a Dissertation and Presentation in the standard format for being evaluated by the Department.	Create	K6
PROJ-CS881.CO6	Prepare a paper for Conference presentation/Publication in Journals, if possible.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	2	2	1	1	-	-	-	-	-	3	1
CO2	2	2	3	3	3	1	-	-	-	-	-	-	3	1
CO3	3	3	3	2	1	-	1	-	-	-	-	-	2	3
CO4	2	2	2	2	2	-	-	-	2	2	2	2	2	3
CO5	2	-	2	-	2	-	-	2	3	3	3	3	2	3
CO6	2	-	2	-	2	-	-	2	3	3	3	3	2	3
AVG.	2	2.25	2.16	2.25	2	1	1	2	2.66	2.66	2.66	2.66	2.33	2.33

INFORMATION TECHNOLOGY
SEMESTER – I
THEORY

Course Title: Mathematics –IA	Code: BS-M101
Type of Course: Theory	Course Designation: Compulsory
Semester: 1st	Contact Hours: 3L+1T/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-M101.CO1	Learn the basic mathematical tools to deal with problems of engineering sciences.	Learn	Level I
BS-M101.CO2	Understand properties and application of Calculus and Linear Algebra .	Understand	Level II
BS-M101.CO3	Analyze of physical or engineering problems.	Analyze	Level IV
BS-M101.CO4	Acquire problem solving skills related to engineering science.	Acquire	Level II
BS-M101.CO5	Apply Calculus and Linear Algebra in real life problems.	Apply	Level III
BS-M101.CO6	Classify ensembles and differentiate between Calculus and Linear Algebra.	Classify	Level IV

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	2
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	1
CO3	3	3	3	2	-	-	-	-	-	-	-	3	2	1
CO4	3	1	2	1	-	-	-	-	-	-	1	3	2	2
CO5	2	2	2	2	-	-	-	-	-	-	2	3	1	-
CO6	3	2	2	2	-	-	-	-	-	-	2	3	-	-
AVG.	2.83	2.33	2.5	2.33	0	0	0	0	0	0	1.6667	3	2	1.5

Course Title: Physics-I	Code: BS-PH101
Type of Course: Theory	Course Designation: Compulsory
Semester: 1st	Contact Hours: 3L+1T/week

Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

Course Outcomes	Details	Action Verb	Knowledge Level
BS-PH101.CO1	Apply basic concepts of mechanics	Apply	K3
BS-PH101.CO2	Discuss Physical optics and analyze principles of lasers with applications	Discuss	K6
BS-PH101.CO3	Categorize di electric and magnetic properties of materials leading to Electromagnetic laws	Categorize	K4
BS-PH101.CO4	Differentiate between Classical Physics and Quantum Physics by introducing Planck's law	Differentiate	K5
BS-PH101.CO5	Apply wave particle duality in real life problems followed by simple quantum mechanics calculations	Apply	K3
BS-PH101.CO6	Classify ensembles and differentiate between classical and Quantum statistical mechanics	Classify	K4

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO5	1	3	2	0	-	-	-	-	-	-	-	-	-	-
CO6	-	1	3	2	-	-	-	-	-	-	-	-	-	-
AVG.	1.80	2.33	1.83	1.00	0	0	0	0	0	0	0	0	0	0

Course Title: Basic Electrical Engineering	**Code: ES-EE101**
Type Of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

ES-EE101.CO1	**Understand and analyze basic electric and magnetic circuits.**	**Understand**	**K2**
ES-EE101.CO2	**Study the working principles of electrical machines and power converters.**	**Study**	**K1**
ES-EE101.CO3	**Introduce the components of low voltage electrical installations.**	**Introduce**	**K1**
ES-EE101.CO4	**Understand the general structure of electrical power system.**	**Understand**	**K2**
ES-EE101.CO5	**Understand the construction and operation of single-phase transformer.**	**Understand**	**K2**
ES-EE101.CO6	**Explain the working principle of power converters.**	**Explain**	**K2**

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO2	2	3	3	2	2	-	-	-	-	-	-	-	-	-
CO3	2	-	3	1	-	-	-	-	-	-	-	1	-	-
CO4	2	-	2	2	3	-	-	-	-	-	-	2	-	-
CO5	2	2	-	2	3	-	-	-	-	-	-	1	-	-
CO6	2	1	3	3	3	-	-	-	-	-	-	1	-	-
AVG.	2.17	2	2.75	2	2.6	0	0	0	0	0	0	1.25	0	0

PRACTICAL

Course Title: Physics-I Laboratory	**Code: BS-PH191**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

BS-PH191.CO1	**Observe and read data in slide calliper's, screw gauge. Calculate different modulus of elasticity to apply basic knowledge Physics of Elasticity and apply viscosity principle of streamline motion of water to calculate its viscosity coefficient required in fluid mechanics**	**Observe**	**K1**
BS-PH191.CO2	**Arrange sequential connection in electrical experiment to verify principles of Kirchhoff's law to verify passive elements of electrical circuit**	**Arrange**	**K3**
BS-PH191.CO3	**Operate optical instruments to illustrate physical properties of light and to observe spectral lines of light to verify medium specific characteristics. Calculate Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant**	**Operate**	**K3**
BS-PH191.CO4	**Determine Band Gap and Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors. Determine the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.**	**Determine**	**K5**
BS-PH191.CO5	**Apply concepts of quantum mechanics to verify Bohr's atomic orbital theory**	**Apply**	**K3**
BS-PH191.CO6	**Determine Planck's constant and Stefan's constant applying modern Physics**	**Determine**	**K5**

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	1	1	-	-	-	-	-	-	-	-	-	-
CO2	2	3	1	1	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	1	-	-	-	-	-	-	-	-	-	-
CO4	2	3	1	2	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	1	-	-	-	-	-	-	-	-	-	-
CO6	2	1	3	2	-	-	-	-	-	-	-	-	-	-
AVG.	2	2.33	2	1.33	0	0	0	0	0	0	0	0	0	0

Course Title: Basic Electrical Engineering Lab	**Code: ES-EE191**
Type of Course: Practical	**Course Designation: Compulsory**

Semester: 1st	**Contact Hours: 2P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-EE191.CO1	Calibrate Ammeter and Wattmeter	Calibrate	K3
ES-EE191.CO2	Demonstrate the measuring instrument and electrical machines	Demonstrate	K3
ES-EE191.CO3	Conduct open circuit and short circuit test of single-phase transformer	Conduct	K2
ES-EE191.CO4	Measure 3 phase power using two wattmeters	Measure	K5
ES-EE191.CO5	Identify the components of LT switchgear	Identify	K1
ES-EE191.CO6	Understand the characteristic of RLC series and parallel circuit	Understand	K2

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	3	-	-	-	2	-	-	-	-	-
CO2	2	3	3	1	2	-	-	-	3	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	2	-	-	-	-	-
CO4	2	-	2	-	3	-	-	-	3	-	-	-	-	-
CO5	1	-	-	-	1	-	-	-	-	-	-	-	-	-
CO6	2	1	2	1	3	-	-	-	2	-	-	-	-	-
AVG.	1.83	2	2.5	1	2.4	0	0	0	2.4	0	0	0	0	0

Course Title: Workshop	**Code: ES-ME192**
Type Of Course: Practical	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 1L+4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-ME192.CO1	Understanding the applications of hand tools and machine tools.	Understand	K2
ES-ME192.CO2	Comprehend the safety measures required to be taken while using the tools.	Comprehend	K2
ES-ME192.CO3	Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.	Select	K2
ES-ME192.CO4	Fabricate components with their own hands	Fabricate	K6
ES-ME192.CO5	Practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes	Analyze	K6
ES-ME192.CO6	Produce small devices of their interest, by assembling different components,	Produce	K6

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	1	-	1	-	-	-	-	-	-
CO3	1	-	-	-	-	1	-	1	1	-	-	-	-	-
CO4	1	-	-	-	-	-	2	-	2	1	1	-	-	1
CO5	1	-	-	-	-	-	2	-	2	1	1	1	-	-
CO6	1	-	-	-	-	-	2	-	2	1	2	1	-	1
AVG.	1	0	0	0	0	1	2	1	1.75	1	1.33	1	0	1

SEMESTER – II
THEORY

Course Title: Chemistry-I	Code: BS-CH 201
Type of Course: Theory	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 3L+1T/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-CH 201.CO1	Apply first and second law of thermodynamics to different chemical and physical processes under specified condition to determine the equilibrium condition, spontaneity and thermo-chemical behaviour of a reaction.	Apply	K3
BS-CH 201.CO2	Using the concept of conductance of ions analyze the design and working principle of different electrochemical cells.	Use	K3
BS-CH 201.CO3	Derive rate of a reaction at a specified temperature under different medium	Derive	K4
BS-CH 201.CO4	Explain the mechanism considering the structure of the molecules and type of electronic effect present in them.	Explain	K5
BS-CH 201.CO5	Analyze different types of fuels for industrial application.	Analyze	K4
BS-CH 201.CO6	Distinguish different types of polymer for diverse application.	Distinguish	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO5	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO6	3	1	1	1	-	-	-	-	-	-	-	-	-	-
AVG.	3	1.66	1	1	0	0	0	0	0	0	0	0	0	0

Course Title:Mathematics –IIA	Code: BS-M201
Type of Course: Theory	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 3L+1T/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-M201.CO1	Learn the basic mathematical tools to deal with problems of engineering sciences.	Learn	K1
BS-M201.CO2	Understand properties and application of Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.	Understand	K2
BS-M201.CO3	Analyze of physical or engineering problems.	Analyze	K4
BS-M201.CO4	Acquire problem solving skills related to engineering science.	Acquire	K2
BS-M201.CO5	Apply Linear Algebra, Ordinary Differential Equations (ODE) and Numerical analysis in real life problems.	Apply	K3
BS-M201.CO6	Classify ensembles and differentiate among Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.	Classify	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	-	-	-	-	-	-	-	3	1	-
CO2	2	2	3	1	-	-	-	-	-	-	-	3	2	-
CO3	3	3	3	1	-	-	-	-	-	-	-	3	1	-
CO4	3	2	3	2	-	-	-	-	-	-	1	3	3	1
CO5	3	2	3	2	-	-	-	-	-	-	2	3	3	-1
CO6	3	2	3	2	-	-	-	-	-	-	2	3	3	2
AVG.	2.83	2.17	3	1.5	0	0	0	0	0	0	1.67	3.00	2.17	1.33

Course Title:Programming for ProblemSolving	Code: ES-CS201
Type of Course: Theory	Course Designation: Compulsory

Semester: 2nd	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-CS201.CO1	Analyze the problem and formulate algorithms for them.	Analyze	K4
ES-CS201.CO2	Translate the algorithms to programs (in C language).	Understand	K2
ES-CS201.CO3	Understand the correct syntax of logical expression, branch instruction, iteration,	Understand	K2
ES-CS201.CO4	Apply array and pointer to solve problem.	Apply	K3
ES-CS201.CO5	Understand the use of , function, recursion.	Understand	K2
ES-CS201.CO6	Build analytical skill.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	3	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO4	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	3	3	3	2	1	1	1	1	1	2	2	2.33	2.33

Course Title:English	**Code: HM-HU201**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 2L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HM-HU201.CO1	Understand and apply English Speech Sounds for enhancing English Communication	Understand	K2
HM-HU201.CO2	Apply English Language Presentation Skill in Academic and in Professional Communication	Apply	K3
HM-HU201.CO3	Apply Receptive Skills of English in Academics and in Engineering Profession	Apply	K3
HM-HU201.CO4	Apply Writing Skill of English in Academics and in Profession	Apply	K3
HM-HU201.CO5	Apply Grammar Skill of English in Academic and in Professional Communication	Apply	K3
HM-HU201.CO6	Apply Critical Thinking Skill of English in Academic and in professionional Communication	Apply	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO2	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO3	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO4	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO5	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO6	2	2	2	2	2	2	-	2	-	3	-	2	1	1
AVG.	2	2	2	2	2	2	0	2	0	3	0	2	1	1

PRACTICAL

Course Title:Chemistry-I Laboratory	Code: BS-CH291
Type of Course: Practical	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 3P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

BS-CH291.CO1	Determine some physical parameter like viscosity of a solution and rate constant of a reaction	Determine	K5
BS-CH291.CO2	Determine the strength of an acid using conductometric method.	Determine	K5
BS-CH291.CO3	Determine the strength of an acid using pH metric method.	Determine	K5
BS-CH291.CO4	Determine partition coefficient of a compound	Determine	K5
BS-CH291.CO5	Estimate the amount of an ion present in a given solution using permanganometric and argentometric methods.	Estimate	K5
BS-CH291.CO6	Evaluate alkalinity (in terms of CaCO3 equvalent), hardness (in ppm) and amount of dissolved oxyzen (in mg/l) present in a given water sample using volumetric method.	Evaluate	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO2	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO3	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO4	1	2	2	3	-	-	-	-	-	-	-	-	-	-
CO5	1	2	2	3	-	-	-	-	-	-	-	-	-	-
CO6	1	2	2	3	-	-	-	-	-	-	-	-	-	-
AVG.	1	1.5	2	3	0	0	0	0	0	0	0	0	0	0

Course Title:Programming for ProblemSolving	Code: ES-CS291
Type of Course: Practical	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-CS291.CO1	Analyze the problem and formulate algorithms for them.	Analyze	K4
ES-CS291.CO2	Translate the algorithms to programs (in C language).	Understand	K2
ES-CS291.CO3	Understand the correct syntax of logical expression, branch instruction, iteration,	Understand	K2

ES-CS291.CO4	Apply array and pointer to solve problem.	Apply	K3
ES-CS291.CO5	Understand the use of , function, recursion.	Understand	K2
ES-CS291.CO6	Build analytical skill.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO2	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO3	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO4	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO5	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO6	2	2	2	2	-	-	-	-	-	-	-	2	2	1
AVG.	2	2	2	2	0	0	0	0	0	0	0	2	2	1

Course Title:Engineering Graphics & Design	Code: ES-ME291
Type of Course: Practical	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 1L+4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-ME291.CO1	Understand the applications of hand tools and machine tools.	Understand	K2
ES-ME291.CO2	Comprehend the safety measures required to be taken while using the tools.	Create	K6
ES-ME291.CO3	Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.	Evaluate	K5
ES-ME291.CO4	Fabricate components with their own hands.	Create	K6

ES-ME291.CO5	Confident on practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.	Understand	K2
ES-ME291.CO6	Produce small devices of their interest by assembling different components.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	1	-	1	-	-	-	-	-	-
CO3	1	-	-	-	-	1	-	1	1	-	-	-	-	-
CO4	1	-	-	-	-	-	2	-	2	1	1	-	-	1
CO5	1	-	-	-	-	-	2	-	2	1	1	1	-	-
CO6	1	-	-	-	-	-	2	-	2	1	2	1	-	1
AVG.	1	0	0	0	0	1	2	1	1.75	1	1.333	1	0	1.00

Course Title:Language Laboratory	**Code: HM-HU291**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 2P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HM-HU291.CO1	Understand and apply English Speech Sounds for enhancing English Communication	Understand	K2
HM-HU291.CO2	Apply English Language Presentation Skill in Academic and in Professional Communication	Apply	K3
HM-HU291.CO3	Apply Receptive Skills of English in Academics and in Engineering Profession	Apply	K3
HM-HU291.CO4	Apply Writing Skill of English in Academics and in Profession	Apply	K3
HM-HU291.CO5	Apply Grammar Skill of English in Academic and in Professional Communication	Apply	K3

HM-HU291.CO6	**Apply Critical Thinking Skill of English in Academic and in professionional Communication**	**Apply**	**K3**

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO2	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO3	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO4	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO5	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO6	2	2	2	2	2	2	-	2	1	3	-	2	1	1
AVG.	2	2	2	2	2	2	0	2	1	3	0	2	1	1

SEMESTER – III
THEORY

Course Title:Analog and Digital Electronics	**Code: CS 301**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS 301.CO1	Explain Different Classes of Amplifiers - (Class-A, B, AB and C, power, efficiency; Summarize the basic concepts of Feedback and Oscillation. Demonstrate Phase Shift, Wein Bridge oscillators Astable & Monostable Multivibrators; Schimtt Trigger circuits, 555 Timer.	Explain	K2
CS 301.CO2	Define the basic concepts of Boolean algebra, binary number system. 1's and 2's complement methods, Binary arithmetic. Define the representation in SOP and POS forms;	Define	K1
CS 301.CO3	Demonstrate the concept of Minimization of logic using algebraic and k-map. Build various combinational circuits like Adder and Subtractor circuits, Encoder, Decoder, Comparator, Multiplexer, De-Multiplexer and Parity Generator.	Demonstrate	K2
CS 301.CO4	Explain Sequential Circuits - Basic Flip-flop & Latch, Flip-flops -SR, JK, D, T and JK Master-slave Flip Flops.	Explain	K2
CS 301.CO5	Build Registers (SISO, SIPO, PIPO, PISO) Ring counter, Johnson counter, Synchronous and Asynchronous counters, Mod N Counter.	Build	K6
CS 301.CO6	Explain A/D and D/A conversion techniques – Basic concepts (D/A :R-2-R only A/D: successiveapproximation). Explain Logic families- TTL, ECL, MOS and CMOS - basic concepts.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	3	3
CO2	3	3	2	2	-	-	-	-	-	1	-	3	3	3
CO3	3	2	2	2	1	-	-	-	-	1	-	3	3	3
CO4	3	3	3	2	3	-	-	-	-	1	1	3	3	3
CO5	3	3	2	2	2	-	-	-	-	-	2	3	3	3
CO6	3	2	1	1	-	-	-	-	-	-	2	3	3	3

AVG .	3	2.6	2	1.8	2	0	0	0	0	1	1	3	3	3

Course Title:Data Structure & Algorithms	**Code: CS302**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS302.CO1	Construct algorithms from problems.	Construct	K3
CS302.CO2	Understand the basics of abstract data types.	Understand	K2
CS302.CO3	Categorize the property of linear and nonlinear data structures.	Categorize	K4
CS302.CO4	Learn the use of Tree and graph.	Learn	K3
CS302.CO5	Compare different shorting and searching methods.	Compare	K5
CS302.CO6	Learn the use of hashing.	Learn	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	3	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO4	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG .	3	3	3	3	2	1	1	1	1	1	2	2.00	2.33	2.33

Course Title:Computer Organisation	**Code: CS303**

Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS303.CO1	Illustrate the history of modern computers and the Von Neumann architecture.	Illustrate	K2
CS303.CO2	Demonstrate basic number systems, Binary numbers, representation of signed and unsigned numbers, Floating point representation.	Demonstrate	K2
CS303.CO3	Define addressing modes, instruction formats.	Define	K1
CS303.CO4	Distinguish the organization of various parts of a system memory hierarchy i.e. cache memory , virtual memory etc.	Distinguish	K4
CS303.CO5	Classify basics of systems topics like, single-cycle (MIPS), multi-cycle (MIPS), parallel, pipelined, superscalar, and RISC/CISC architectures.	Classify	K4
CS303.CO6	Define different control unit operations and I/O organization.	Define	K1

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	-	-	-	-	3	2
CO2	3	3	3	3	3	-	-	-	-	-	1	-	3	2
CO3	3	3	3	1	3	-	-	-	-	-	2	-	1	3
CO4	3	2	3	3	2	-	-	-	-	-	1	-	2	3
CO5	3	2	3	3	-	-	-	-	-	-	2	2	3	3
CO6	3	3	3	2	3	-	-	-	-	-	3	3	3	3
AVG.	3	2.67	3	2.5	2.6	0	0	0	0	0	1.8	2.5	2.5	2.33

PRACTICAL

Course Title:Analog and Digital Electronics	**Code: CS391**

Type of Course: Practical	Course Designation: Compulsory
Semester: 3rd	Contact Hours: 4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS391.CO1	Understand of the fundamental concepts and techniques used in digital electronics.	Understand	K2
CS 391.CO2	Understand and examine the structure of various number systems and its application in digital design.	Understand	K2
CS391.CO3	Apply the basic requirements for a design application and propose a cost effective solution of various combinational circuits.	Apply	K3
CS391.CO4	Analyze basic requirements for a design application and propose a cost effective solution of various sequential circuits.	Analyze	K4
CS391.CO5	Identify and prevent various hazards and timing problems in a digital design for developing skill to build, and troubleshoot in digital circuits.	Identify	K3
CS391.CO6	Design and examine the structure of analog circuits and verify its operations.	Design	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	1	0	0	-	-	-	1	3	3	3
CO2	3	3	3	1	1	0	0	-	-	1	1	3	3	3
CO3	3	3	3	-	-	0	0	1	-	1	1	3	3	3
CO4	3	3	2	2	1	0	0	1	2	1	1	3	3	3
CO5	3	2	1	-	2	0	0	2	2	1	1	3	3	3
CO6	3	2	2	-	2	0	0	2	2	-	1	3	3	3
AVG.	3	2.67	2.33	1.33	1.4	0	0	1.5	2	1	1	3.00	3.00	3

Course Title:Data Structure & Algorithm Lab	Code: CS392

Type of Course: Practical	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS392.CO1	Construct algorithms from problems.	Construct	K3
CS392.CO2	Understand the basics of Stack, Queue.	Understand	K2
CS392.CO3	Categorize the necessarily of linked list and array implementation.	Categorize	K4
CS392.CO4	Learn the real life use of Tree and graph.	Learn	K3
CS392.CO5	Compare different shorting and searching methods.	Compare	K5
CS392.CO6	Understand the implementation mechanism of shorting and searching.	Understand	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	2	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	2	-	-	-	-	1	1	-	2	2	2
CO4	3	2	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	2	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	2.67	2.83	2.83	2	1	1	1	1	1	2	2	2.33	2.33

Course Title:Computer Organization Lab	**Code: CS393**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS393.CO1	Understand the behaviour of logic gates.	Understand	K2
CS393.CO2	Design combinational circuits for basic components of computer system and Applications.	Design	K6
CS393.CO3	Analyze the operational behaviour and applications of various flip-flop.	Analyze	K4
CS393.CO4	Implement Arithmetic logic units and different types of memory blocks.	Implement	K3
CS393.CO5	Design to cascade multiple RAM chips for vertical and horizontal expansion.	Design	K6
CS393.CO6	Implement Carry-Look-Ahead Adder and BCD adder circuit .	Implement	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3	3	1	2	3	3	2	2	3	1
CO2	3	3	1	2	1		1	2	3	3	2	2	-	1
CO3	3	3	2	2	2	1	1	2	2	2	1	3	2	1
CO4	3	3	2	2	2	1	1	2	2	2	2	3	1	3
CO5	3	3	3	2	3	1	1	2	2	2	1	3	-	1
CO6	3	3	3	2	3		1	2	3	3	2	3	3	2
AVG.	3	3	2.33	2	2.3	1.5	1	2	2.5	2.5	1.67	2.67	2.25	1.5

SEMESTER – IV
THEORY

Course Title: Formal Language & Automata Theory	**Code: CS402**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS402.CO1	Write a formal notation for strings, languages and machines.	Write	K6
CS402.CO2	Design finite automata to accept a set of strings of a language.	Design	K6
CS402.CO3	For a given language determine whether the given language is regular or not	Determine	K5
CS402.CO4	Design context free grammars to generate strings of context free language.	Design	K6
CS402.CO5	Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars	Determine	K5
CS402.CO6	Write the hierarchy of formal languages, grammars and machines and Distinguish between computability and non-computability and Decidability and undecidability	Write	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	-	-	3	3	2
CO2	3	3	2	2	2	-	-	-	-	-	-	3	3	2
CO3	3	1	2	2	2	-	-	-	-	-	-	3	2	2
CO4	3	2	2	2	3	-	-	-	-	-	1	3	2	3
CO5	3	3	2	2	3	-	-	-	-	-	2	3	2	2
CO6	3	3	2	2	3	-	-	-	-	-	2	3	2	2
AVG.	3	2.5	2.17	2	2.5	0	0	0	0	0	1.67	3	2.33	2.17

Course Title: Object Oriented Programming & UML	**Code:IT401**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4^{th}	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
T401.CO1	Describe classes, objects, members of a class and relationships among them needed for a specific problem.	Describe	K1
IT401.CO2	Explain the features of object-oriented principles such as encapsulation, polymorphism and composition of systems based on object identity.	Explain	K2
IT401.CO3	Analyze the concepts of inheritance and its application in OO design with different design patterns.	Analyze	K4
IT401.CO4	Discuss simple abstract data types and design implementations using abstraction functions to document them.	Discuss	K2
IT401.CO5	Apply some common object-oriented design patterns and give examples of their use.	Apply	K3
IT401.CO6	Design applications with an event-driven graphical user interface.	Design	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	2	-	-	-	2	-	-	2	2	2	1
CO2	3	3	1	3	-	-	-	1	-	-	2	2	2	3
CO3	3	3	2	3	-	-	-	3	-	-	2	2	3	2
CO4	3	3	2	3	-	-	-	3	-	-	2	2	3	2
CO5	3	3	-	1	-	-	-	2	2	2	2	2	2	1
CO6	3	3	-	3	-	-	-	3	2	2	2	2	3	2
AVG.	3	3	1.5	2.5	0	0	0	2.33	2	2	2	2	2.5	1.83

Course Title:Mathematics-III	**Code: M401**
Type of Course: Theory	**Course Designation: Compulsory**

Semester: 4TH	**Contact Hours: 2L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
M401.CO1	Apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines.	Apply	K3
M401.CO2	Learn the tools of power series and Fourier series to analyze engineering problems and apply it to solve different problems by expressing functions in suitable series form.	Learn	K2
M401.CO3	Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points of different surfaces of higher dimensions.	Apply	K3
M401.CO4	Apply the knowledge of double and triple integral in different fields of Engineering to find area, volume and shape of different objects and also to get some physical properties like centre of gravity, moment of inertia, etc.	Apply	K3
M401.CO5	Solve and model many core engineering problems with application of ODE of 1st order and higher order, Simultaneous Linear Differential Equation, Improper Integral and Laplace Transform.	Solve	K3
M401.CO6	Identify and solve different type of graphs and Analyze/Model application of Graph Theory in Information Science.	Identify	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO2	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO3	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO4	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO5	3	2	2	-	-	-	-	-	-	-	-	-	2	1
CO6	3	3	2	1	-	-	-	-	-	-	-	-	2	1
AVG.	3	3	2	1	0	0	0	0	0	0	0	0	2	1

PRACTICAL

Course Title: Object Oriented Programming Lab	**Code: IT491**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT491.CO1	Define an object oriented programming language, and associated class libraries and learn how to develop object oriented programs.	Define	K1
IT491.CO2	Understand the concepts of class, constructor, data encapsulation, inheritance, overriding and polymorphism to describe large scale software.	Understand	K2
IT491.CO3	Develop and debug programs using object oriented principles with wrapper class, arrays.	Develop	K3
IT491.CO4	Apply the concept of interfaces- multiple inheritance, extending interfaces.	Apply	K3
IT491.CO5	Analyze and use an integrated environment development by creating and accessing packages and multithreaded programming	Analyze	K4
IT491.CO6	Develop programs with Graphical User Interfaces capabilities and solve related problems.	Develop	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	2	-	-	-	2	-	-	2	2	1
CO2	3	3	3	1	3	-	-	-	1	-	-	2	2	3
CO3	3	3	3	2	3	-	-	-	3	-	-	2	3	2
CO4	3	3	3	2	3	-	-	-	3	-	-	2	3	2
CO5	3	3	3	-	1	-	-	-	2	2	2	2	2	1
CO6	3	3	3	-	3	-	-	-	3	2	2	2	3	2
AVG.	3	3	3	1.5	2.5	0	0	0	2.3	2	2	2	2.5	1.8

SEMESTER – V
THEORY

Course Title:Economics for Engineers (Humanities-II)	Code: HU501
Type of Course: Theory	Course Designation: Compulsory
Semester: 5TH	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HU501.CO1	Understand major principles of economic analysis for decision making among alternative courses of action in engineering.	Understand	K2
HU501.CO2	Apply economic principles to prices and quantities in competitive supply and demand for goods and for money.	Apply	K3
HU501.CO3	Solve economic problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis.	Solve	K3
HU501.CO4	Evaluate the effect of inflation,deflation and price change with indexes in Engineering Economic Analysis	Evaluate	K5
HU501.CO5	Analyze the effect of uncertainty in economic analysis by using various concepts like expected value, estimates and simulation	Analyze	K4
HU501.CO6	Understand the concepts of depreciation and replacement analysis and solve associated problems	Understand	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO2	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO3	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO4	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO5	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO6	2	2	2	2	-	2	-	1	-	-	3	1	1	1
AVG.	2	2	2	2	0	2	0	1	0	0	3	1	1	1

Course Title: Design and Analysis of Algorithms	**Code: IT501**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 5TH	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT501.CO1	Analyse the complexities of different algorithms.	Analyze	K4
IT501.CO2	Develop the algorithm techniques (example Divide & Conquer, Dynamic Programming etc) to solve different mathematical models.	Develop	K3
IT501.CO3	Illustrate the techniques of Greedy paradigm, Branch and Bound, Backtracking etc and compare and contrast them.	Illustrate	K2
IT501.CO4	Discuss the types of Minimal spanning tree and traversal algorithm with their applications.	Discuss	K6
IT501.CO5	Understand the variations among tractable and intractable problems to introduce polynomial and non-polynomial reduction.	Understand	K2
IT501.CO6	Explain the randomized algorithms and approximation algorithms to illustrate their applications.	Explain	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO3	3	3	3	3	2	-	-	-	-	-	-	-	3	1
CO4	3	3	3	2	2	-	-	-	-	-	-	-	3	2
CO5	3	3	3	1	1	-	2	-	-	-	-	-	2	3
CO6	3	3	3	2	2	2	1	-	-	-	-	-	2	3
AVG.	3	2.83	3	2	1.75	2	1.5	0	0	0	0	0	2.67	2.25

Course Title:Computer Architecture	**Code: IT502**
Type of Course: Theory	**Course Designation: Compulsory**

Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT502.CO1	Understand The basic of Computer architecture	Understand	K2
IT502.CO2	Discuss the Pipelining technique of Computer architecture	Discuss	K6
IT502.CO3	Illustrate Different memory management technology	Illustrate	K2
IT502.CO4	Develop The Instruction level parallelism	Develop	K3
IT502.CO5	Analyze array and vector processors.	Analyze	K4
IT502.CO6	Explain the multiprocessor architecture and different taxonomy	Explain	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	2	3
CO2	2	2	2	1	-	-	-	-	-	-	-	-	3	3
CO3	1	-	2	2	1	-	1	-	-	-	-	-	3	2
CO4	-	3	2	-	1	-	-	-	-	-	-	-	3	2
CO5	-	1	3	-	2	1	-	-	-	-	-	1	2	3
CO6	-	2	2	1	2	1	1	1	-	1	-	-	2	2
AVG.	1.67	2	2.2	1.33	1.5	1	1	1	0	1	0	1.00	2.50	2.5

Course Title: Operating Systems	**Code:IT503**
Type Of Course: Theory	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

IT503.CO1	**Demonstrate the concepts of Operating System Services, System calls, structure and types.**	**Demonstrate**	**K2**
IT503.CO2	**Discuss processes and threads for multiprogramming and multi-threading.**	**Discuss**	**K6**
IT503.CO3	**Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response**	**Develop**	**K3**
IT503.CO4	**Explain algorithmic solutions to process synchronization problems for Inter-Process communication**	**Explain**	**K5**
IT503.CO5	**Analyse the necessary conditions for Deadlock avoidance and prevention to solve them.**	**Analyze**	**K6**
IT503.CO6	**Explain Memory management, Virtual Memory, I/O Hardware, File and Disk Management system.**	**Explain**	**K2**

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	-	2	2	3	2	3	-	2	3	3
CO2	3	2	1	1	2	-	-	3	3	1	1	3	3	2
CO3	3	2	3	1	1	-	-	2	3	2	2	2	3	2
CO4	3	3	3	2	-	-	-	3	3	2	2	2	3	2
CO5	3	2	1	1	3	-	-	2	3	1	2	2	3	2
CO6	3	2	2	1	-	-	-	2	2	-	2	1	3	2
AVG.	3	2	1.83	1.167	2	2	2	2.5	2.667	1.8	1.8	2	3.00	2.17

PRACTICAL

Course Title: Design & Analysis Algorithm Lab	**Code: IT591**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT591.CO1	**Analyse different types of applications of Divide & Conquer techniques**	**Analyze**	**K4**

IT591.CO2	Understanding to implement Dynamic Programming techniques	Understand	K2
IT591.CO3	Examine to implement knapsack, Job sequencing with deadlines, Prim's and Kruskal's algorithms by using greedy method	Examine	K4
IT591.CO4	Discuss the implementation of the N-Queen and Graph Coloring Problem by using Backtracking	Discuss	K6
IT591.CO5	Develop 15 Puzzle problem by using Branch & Bound	Develop	K3
IT591.CO6	Explain the way of implementation of BFS and DFS by using Graph Traversal Algorithms	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	2
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	1
CO4	3	3	3	1	-	-	-	-	-	-	-	-	3	1
CO5	3	3	3	1	1	-	-	-	-	-	-	-	3	2
CO6	3	3	3	3	2	-	-	1	-	-	-	-	3	3
AVG.	3	3	3	1.67	1.5	0	0	1	0	0	0	0	3	1.8

Course Title: Computer Architecture Lab	Code: IT592
Type of Course: Practical	Course Designation: Compulsory
Semester: 5TH	Contact Hours: 4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Course Coordinator :	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT592.CO1	Discuss the various logic gates using the VHDL programming language.	Discuss	K6
IT592.CO2	Understanding the arithmetic operations of n-bit numbers using VHDL.	Understand	K2
IT592.CO3	Analyzing the synthesis of different combinational circuits using VHDL.	Analyze	K4

IT592.CO4	**Illustrate the synthesis of the different sequential circuits using VHDL.**	**Illustrate**	**K2**
IT592.CO5	**Explain the construction of different memory elements using VHDL.**	**Explain**	**K5**
IT592.CO6	**Develop different processing elements using VHDL.**	**Develop**	**K3**

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	2	2	1	-	-	0	-	-	-	-	2	3
CO2	2	2	2	1	1	-	-	0	-	-	-	-	2	2
CO3	2	1	2	2	-	-	-	0	1	-	-	-	2	2
CO4	3	3	3	2	-	-	-	0	1	-	-	-	3	2
CO5	3	2	2	1	1	2	2	0	1	-	-	1	2	2
CO6	3	2	3	2	1	2	1	0	1	1	2	2	3	3
AVG.	2.67	2	2.33	1.67	1	2	1.5	0	1	1	2	1.50	2.33	2.33

Course Title: Operating System Lab	**Code: IT593**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT593.CO1	**Understanding of different Unix/Linux commands and shell programming**	**Understand**	**K2**
IT593.CO2	**Demonstrate the creation of processes and POSIX threads.**	**Demonstrate**	**K3**
IT593.CO3	**Develop the problems of process scheduling and process synchronization (Signal and Semaphore)**	**Develop**	**K6**
IT593.CO4	**Determine the deadlock avoidance and detection algorithms.**	**Determine**	**K5**
IT593.CO5	**Analyse different Memory allocation and File accessing techniques**	**Analyse**	**K4**
IT593.CO6	**Illustrate Inter-Process Communication through system calls.**	**Illustrate**	**K2**

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	1	-	-	-	-	-	-	1	3	3
CO2	3	3	3	2	3	-	-	2	-	-	-	2	3	1
CO3	3	3	3	2	3	-	-	2	1	-	-	2	3	2
CO4	3	3	3	2	3	-	-	2	-	-	1	2	3	3
CO5	3	3	3	2	3	-	-	1	1	-	1	2	3	3
CO6	3	3	2	1	1	-	-	-	1	-	-	1	3	3
AVG.	3.00	3.00	2.83	1.67	2.33	0	0	1.75	1.00	0	1.00	1.67	3.00	2.50

SEMESTER – VI
THEORY

Course Title: Principles of Management	**Code: HU-601**
Type Of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HU-601.CO1	Basic concepts of management: Definition – Essence, Functions, Roles, LevelFunctions of Management: Planning – Concept, Nature, Types, Analysis, Management by objectives; Organisation Structure – Concept, Structure, Principles, Centralization, Decentralization, Span of Management; Organisational Effectiveness..	Demonstrate	K2
HU-601.CO2	Management and Society – Concept, External Environment, CSR, Corporate Governance, Ethical Standards.	Discuss	K6
HU-601.CO3	People Management – Overview, Job design, Recruitment & Selection, Training & Development, Stress Management.	Develop	K3
HU-601.CO4	Managerial Competencies – Communication, Motivation,	Explain	K5
HU-601.CO5	Team Effectiveness, Conflict Management, Creativity, Entrepreneurship	Analyze	K6
HU-601.CO6	Leadership: Concept, Nature, Styles. Decision making: Concept, Nature, Process, Tools & techniquesEconomic, Financial & Quantitative Analysis – Production, Markets, National Income Accounting, Financial Function & Goals, Financial Statement & Ratio Analysis	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	-	2	2	3	2	3	-	2	3	3
CO2	3	2	1	1	2	-	-	3	3	1	1	3	3	2
CO3	3	2	3	1	1	-	-	2	3	2	2	2	3	2
CO4	3	3	3	2	-	-	-	3	3	2	2	2	3	2

CO5	3	2	1	1	3	-	-	2	3	1	2	2	3	2
CO6	3	2	2	1	-	-	-	2	2	-	2	1	3	2
AVG.	3	2	1.83	1.167	2	2	2	2.5	2.667	1.8	1.8	2	3.00	2.17

Course Title: Database Management Systems	**Code: IT601**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT601.CO1	Describe the basic concept of database and different database models along with database languages like DDL, DML etc, Data Abstraction, and Data Independence.	Describe	K1
IT601.CO2	Identify different approaches for solving queries such as Relational algebra, Tuple and domain relational calculus, considering the query optimization strategies, and different normal forms for relational database normalization.	Identify	K3
IT601.CO3	Evaluate the applications of different storage strategies such as Indices, B-trees, hashing	Evaluate	K5
IT601.CO4	Understand the transaction processing and concurrency control strategies including ACID property, serializability of scheduling, locking and timestamp based schedulers, Database recovery.	Understand	K2
IT601.CO5	Analyze the database security approaches including authentication, authorization and access control, DAC, MAC and RBAC models, intrusion detection, SQL injection etc.	Analyze	K4
IT601.CO6	Explain the advanced concepts related to DBMS such as object oriented and object relational databases, logical databases, web databases, distributed databases, data warehousing and data mining.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	1	1	-	-	-	-	-	-	1	2	-
CO2	2	-	2	2	-	-	1	-	-	-	-	-	2	-

CO3	-	2	2	2	2	-	-	2	-	-	1	-	3	1
CO4	1	3	3	1	2	-	-	-	-	-	-	-	3	2
CO5	1	2	-	2	1	-	-	-	-	-	2	-	2	-
CO6	2	2	2	2	2	3	-	-	-	-	-	-	2	1
AVG .	1.6	2.2	2.2	1.6	1.6	3	1	2	0	0	1.5	1.00	2.33	1.33

Course Title: Computer Networking	**Code: IT602**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT602.CO1	Describe the fundamental concepts of computer networking, Data Communications System and learn its components.	Describe	K1
IT602.CO2	Explain the concept of function(s) of each layer of the OSI model and learn about TCP/IP.	Explain	K2
IT602.CO3	Identify the different types of network topologies, protocols, networking devices and make concepts about their functions within a network.	Identify	K3
IT602.CO4	Simplify building the skills of subnetting and routing mechanisms.	Simplify	K4
IT602.CO5	Justify the different system component parts of the network	Justify	K5
IT602.CO6	Develop an expertise in some specific areas of networking such as the design and learn about maintenance of individual networks	Develop	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	2	2	-	-	-	-	-	-	3	3	2
CO2	3	2	1	2	2	-	-	-	-	-	-	3	3	2
CO3	3	2	-	2	2	-	-	-	-	-	-	3	2	2
CO4	3	3	2	2	3	-	-	-	-	-	1	3	2	3

CO5	2	3	2	2	3	-	-	-	-	-	2	3	2	2
CO6	2	3	2	2	3	-	-	-	-	-	2	3	2	2
AVG.	2.66	2.33	1.75	2	2.5	0	0	0	0	0	1.67	3.00	2.33	2.17

Course Title: Computer Graphics	Code: IT604B
Type of Course: Theory	Course Designation: Elective
Semester: 6th	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT604B.CO1	Introduction to computer graphics & graphics systems Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations;	Learn	K1
IT604B.CO2	Visualization & image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software.	Understand	K2
IT604B.CO3	2D transformation & viewing Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, transformations between coordinate systems	Design	K6
IT604B.CO4	3D transformation & viewing 3D transformations: translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, view port clipping, 3D viewing.	Compare	K4
IT604B.CO5	Hidden surfaces Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Painter's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods , fractal - geometry	Explain	K2
IT604B.CO6	Color & shading models Light & color model; interpolative shading model; Texture. Introduction to Ray-tracing:	Develop	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
CO2	-	-	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	2	1	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	1	-	-	-	-	-	-	-	1	-
CO5	-	-	-	2	1	-	-	-	-	-	-	-	1	-
CO6	-	-	3	2	1	-	-	-	-	-	-	-	1	2
AVG.	0	0	3	2	1	0	0	0	0	0	0	0	1	1.5

Course Title:Discrete Mathematics	**Code: IT605A**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 6^{th}	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT605A.CO1	Define fundamental mathematical concepts such as sets, relations, functions, and integers.	Define	K1
IT605A.CO2	Demonstrate induction hypotheses and simple induction proofs.	Demonstrate	K2
IT605A.CO3	Solve numbers of possible outcomes of elementary combinatorial processes such as permutations and combinations.	Solve	K3
IT605A.CO4	Explain a logic sentence in terms of predicates, quantifiers, and logical connectives.	Explain	K2
IT605A.CO5	Classify algebraic structure for a given mathematical problem.	Classify	K4
IT605A.CO6	Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction.	Apply	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	2	2	-	-	-	-	-	3	-	1
CO2	3	3	-	-	3	3	-	-	-	-	-	3	-	1
CO3	3	3	3	2	3	-	-	-	-	-	-	3	1	1

CO4	3	3	1	3	2	2	-	-	-	-	-	3	2	2
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO6	3	3	3	3	3	2	-	-	-	-	-	3	3	3
AVG.	3	3	2.5	2.75	2.6	2.25	0	0	0	0	0	3.00	2.25	1.84

Course Title: Database Management System Lab	**Code: CS691**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 6^{th}	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CS691.CO1	Analyze and transform an Entity Relationship Model into a relational database schema and to use a data definition language to implement the schema using a DBMS	Analyze	K4
CS691.CO2	Declare and enforce integrity constraints on a database using a DBMS	Declare	K1
CS691.CO3	Populate and query a database using SQL DML/DDL commands.	Populate	K3
CS691.CO4	Retrieve of data from a database.	Retrieve	K3
CS691.CO5	Describe and implement relational algebra expression using aggregate functions, joins and sub-queries.	Describe	K1
CS691.CO6	Compile programs in PL/SQL including stored procedures, stored functions, cursors, packages.	Compile	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	3	1	-	1	2	-	1	2	2	1
CO2	3	2	3	2	3	1	-	-	2	-	1	2	2	1
CO3	3	2	3	2	3	1	-	2	2	-	1	2	2	1

PRACTICAL

Course Title: Database Management System Lab	Code: IT691
Type of Course: Practical	Course Designation: Compulsory
Semester: 6th	Contact Hours: 4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT691.CO1	Analyze and transform an Entity Relationship Model into a relational database schema and to use a data definition language to implement the schema using a DBMS	Analyze	K4
IT691.CO2	Declare and enforce integrity constraints on a database using a DBMS	Declare	K1
IT691.CO3	Populate and query a database using SQL DML/DDL commands.	Populate	K3
IT691.CO4	Retrieve of data from a database.	Retrieve	K3
IT691.CO5	Describe and implement relational algebra expression using aggregate functions, joins and sub-queries.	Describe	K1
IT691.CO6	Compile programs in PL/SQL including stored procedures, stored functions, cursors, packages.	Compile	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	3	1	-	1	2	-	1	2	2	1
CO2	3	2	3	2	3	1	-	-	2	-	1	2	2	1
CO3	3	2	3	2	3	1	-	2	2	-	1	2	2	1

Course Title: Computer Networks Lab	Code: IT692
Type of Course: Practical	Course Designation: Compulsory
Semester: 6th	Contact Hours: 4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT692.CO1	Describe the Networking cables (CAT5, UTP), Connectors (RJ45, T-connector) and installation of Network Interface Card .	Describe	K1
IT692.CO2	Explain the working and difference of various networking devices like Hub, Bridge, Network Switch, Router and Modem.	Explain	K2
IT692.CO3	Developed a client server socket programming using TCP and UDP approach in C and Java.	Develop	K3
IT692.CO4	Generate techniques Data link Layer Flow control mechanisms like Stop &Wait and Sliding Window using C.	Generate	K4
IT692.CO5	Explain how to implement Data Link Layer Error Detection Mechanism (Cyclic Redundancy Check) and error control mechanism like Selective Repeat and GoBack-N algorithm using C.	Explain	K5
IT692.CO6	Create the server setup configuration using different process like FTP, DNS, TelNet,NFS and concept of Firewall.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	-	3	-	-	-	2	-	3	-	3	3
CO2	3	2	3	-	3	-	-	-	0	-	3	-	3	1
CO3	3	2	3	-	3	-	-	-	2	-	3	3	3	1
CO4	3	2	3	-	3	-	-	-	2	-	3	3	3	2
CO5	3	2	3	-	3	-	-	-	0	-	3	0	3	3
CO6	3	2	3	-	3	-	-	-	3	-	3	3	3	3
AVG.	3	2	3	0	3	0	0	0	2.25	0	3	3	3	2.17

SEMESTER – VII
THEORY

Course Title: Multimedia	**Code: IT702**
Type of Course: Theory	**Course Designation: Elective**
Semester: 7^{th}	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT702.CO1	Learn technical aspect of Multimedia Systems	Learn	K1
IT702.CO2	Understand the standards available for different audio,video Image and text applications	Understand	K2
IT702.CO3	Design various available storage model for multimedia and can give a comparison study between them	Design	K6
IT702.CO4	Compare between different available multimedia document architecture	Compare	K4
IT702.CO5	Explain technical aspects of popular multimedia web applications, including VoD and VoIP	Explain	K2
IT702.CO6	Develop multimedia application and analyze the performance of the same	Develop	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
CO2	-	-	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	2	1	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	1	-	-	-	-	-	-	-	1	-
CO5	-	-	-	2	1	-	-	-	-	-	-	-	1	-
CO6	-	-	3	2	1	-	-	-	-	-	-	-	1	2
AVG.	0	0	3	2	1	0	0	0	0	0	0	0	1	1.5

Course Title: E-Commerce	**Code: IT703A**

Type of Course: Theory	**Course Designation: Elective**
Semester: 7th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT703A.CO1	Describe the fundamental concept and scope of E-Commerce, relation between E-Commerce and Networking and their concerned hardware.	Describe	K1
IT703A.CO2	Explain various business model an E- fo developing E-Commerce s d strategies r	Explain	K2
IT703A.CO3	Understand the role of Conve1rgence, Collaborative Computing, Content Management & Call Center in E-Commerce and Supply Chain Management	Understand	K2
IT703A.CO4	Analyze the mechanism & security issues related to E-Payment and E-Marketing.	Analyze	K4
IT703A.CO5	Apply the knowledge of EDI Models and Security Standards in E-Commerce applications.	Apply	K3
IT703A.CO6	Elaborate the concept of Enterprise Resource Planning using different ERP Packages	Elaborate	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	-	-	1	2	-	-	-	-	1	1	1	1
CO2	1	2	2	1	1	1	-	-	-	-	1	-	2	-
CO3	1	1	1	1	1	-	-	-	-	-	1	-	1	-
CO4	1	1	1	1	1	1	-	-	-	-	1	-	2	1
CO5	1	1	1	1	1	1	-	-	-	-	1	-	2	-
CO6	2	2	2	2	3	2	-	-	1	-	2	1	2	2

Course Title: Sensor Network	**Code: IT704D**
Type of Course: Theory	**Course Designation: Elective**
Semester: 7th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**

Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT704D.CO1	Discuss the wireless network and MANET.	Discuss	K6
IT704D.CO2	Understand the sensor node architecture	Understand	K2
IT704D.CO3	Illustrate the different Communication protocol for WSN	Illustrate	K2
IT704D.CO4	Analyze the routing protocol for WSN	Analyze	K4
IT704D.CO5	Develop the topology control for WSN	Develop	K3
IT704D.CO6	Explain the mote architecture OS used in WSN	Explain	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	-	-	3	3	2
CO2	3	3	2	2	2	-	-	-	-	-	-	3	3	2
CO3	3	1	2	2	2	-	-	-	-	-	-	3	2	2
CO4	3	2	2	2	3	-	-	-	-	-	1	3	2	3
CO5	3	3	2	2	3	-	-	-	-	-	2	3	2	2
CO6	3	3	2	2	3	-	-	-	-	-	2	3	2	2
AVG.	3	2.5	2.17	2	2.5	0	0	0	0	0	1.67	3	2.33	2.17

SEMESTER – VIII
THEORY

Course Title: Project Management	**Code: HU801B**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 8th	**Contact Hours: 2L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HU801B.CO1	Examine role of entrepreneur in economic development	Examine	K3
HU801B.CO2	Describe the steps to establish an enterprise	Describe	K1
HU801B.CO3	Compare and classify types of entrepreneurs	Compare	K4
HU801B.CO4	Evaluate the entrepreneurial support in India	Evaluate	K5
HU801B.CO5	Describe Special institutionsfor entrepreneurial development and assistance in India	Describe	K1
HU801B.CO6	Explain project Identification	Explain	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	-	-	-	3	3	1
CO2	3	3	3	3	3	-	-	-	-	-	-	2	3	2
CO3	3	3	3	1	3	1	1	-	-	-	-	3	3	2
CO4	3	3	3	3		-	-	-	-	-	-	3	3	2
CO5	3	3	3	3	2	-	-	-	-	-	-	3	2	2
CO6	3	3	3	2	3	2	2	-	-	-	1	3	3	3
AVG.	3	3	3	2.5	2.6	1.5	1.5	0	0	0	1	2.83	2.83	2

Course Title: Cryptography and Network Security	**Code: IT801D**
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**

Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
IT801D.CO1	Describe conceptual understanding of network security issues, challenges and mechanisms common network vulnerabilities and attacks and basic concept of cryptography.	Describe	K1
IT801D.CO2	Evaluate various techniques of cryptography.	Evaluate	K5
IT801D.CO3	Illustrate the algorithms of different key symmetric cryptography.	Illustrate	K2
IT801D.CO4	Apply the public key algorithms, digital signature and message digest.	Apply	K3
IT801D.CO5	Analyze the approaches of and security protocol authentication.	Analyze	K4
IT801D.CO6	Explain the concept of electronic mail security and types of firewall and its configurations.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	1	3	3
CO2	3	3	3	-	2	-	-	-	-	-	-	-	3	2
CO3	2	2	1	2	3	1	-	1	1	3	-	-	3	2
CO4	3	3	2	2	3	1	2	1	0	2	-	-	3	2
CO5	3	2	3	2	1	-	-	-	-	1	-	-	2	2
CO6	3	2	3	2	2	2	-	-	-	-	-	-	2	2
AVG.	2.83	2.5	2.33	2	2.2	1.33	2	1	0.5	2	0	1	2.67	2.167

ELECTRICAL ENGINEERING
SEMESTER – I
THEORY

Course Title: Mathematics –IA	**Code: BS-M101**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-M101.CO1	Learn the basic mathematical tools to deal with problems of engineering sciences.	Learn	Level I
BS-M101.CO2	Understand properties and application of Calculus and Linear Algebra .	Understand	Level II
BS-M101.CO3	Analyze of physical or engineering problems.	Analyze	Level IV
BS-M101.CO4	Acquire problem solving skills related to engineering science.	Acquire	Level II
BS-M101.CO5	Apply Calculus and Linear Algebra in real life problems.	Apply	Level III
BS-M101.CO6	Classify ensembles and differentiate between Calculus and Linear Algebra.	Classify	Level IV

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	2
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	1
CO3	3	3	3	2	-	-	-	-	-	-	-	3	2	1
CO4	3	1	2	1	-	-	-	-	-	-	1	3	2	2
CO5	2	2	2	2	-	-	-	-	-	-	2	3	1	-
CO6	3	2	2	2	-	-	-	-	-	-	2	3	-	-
AVG.	2.83	2.33	2.5	2.33	0	0	0	0	0	0	1.6667	3	2	1.5

Course Title: Physics-I	**Code: BS-PH101**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3L+1T/week**

Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

Course Outcomes	Details	Action Verb	Knowledge Level
BS-PH101.CO1	Apply basic concepts of mechanics	Apply	K3
BS-PH101.CO2	Discuss Physical optics and analyze principles of lasers with applications	Discuss	K6
BS-PH101.CO3	Categorize di electric and magnetic properties of materials leading to Electromagnetic laws	Categorize	K4
BS-PH101.CO4	Differentiate between Classical Physics and Quantum Physics by introducing Planck's law	Differentiate	K5
BS-PH101.CO5	Apply wave particle duality in real life problems followed by simple quantum mechanics calculations	Apply	K3
BS-PH101.CO6	Classify ensembles and differentiate between classical and Quantum statistical mechanics	Classify	K4

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO5	1	3	2	0	-	-	-	-	-	-	-	-	-	-
CO6	-	1	3	2	-	-	-	-	-	-	-	-	-	-
AVG.	1.80	2.33	1.83	1.00	0	0	0	0	0	0	0	0	0	0

Course Title: Basic Electrical Engineering	**Code: ES-EE101**
Type Of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

ES-EE101.CO1	Understand and analyze basic electric and magnetic circuits.	Understand	K2
ES-EE101.CO2	Study the working principles of electrical machines and power converters.	Study	K1
ES-EE101.CO3	Introduce the components of low voltage electrical installations.	Introduce	K1
ES-EE101.CO4	Understand the general structure of electrical power system.	Understand	K2
ES-EE101.CO5	Understand the construction and operation of single-phase transformer.	Understand	K2
ES-EE101.CO6	Explain the working principle of power converters.	Explain	K2

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO2	2	3	3	2	2	-	-	-	-	-	-	-	-	-
CO3	2	-	3	1	-	-	-	-	-	-	-	1	-	-
CO4	2	-	2	2	3	-	-	-	-	-	-	2	-	-
CO5	2	2	-	2	3	-	-	-	-	-	-	1	-	-
CO6	2	1	3	3	3	-	-	-	-	-	-	1	-	-
AVG.	2.17	2	2.75	2	2.6	0	0	0	0	0	0	1.25	0	0

PRACTICAL

Course Title: Physics-I Laboratory	**Code: BS-PH191**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-PH191.CO1	Observe and read data in slide calliper's, screw gauge. Calculate different modulus of elasticity to apply basic knowledge Physics of Elasticity and apply viscosity principle of streamline motion of water to calculate its viscosity coefficient required in fluid mechanics	Observe	K1

BS-PH191.CO2	Arrange sequential connection in electrical experiment to verify principles of Kirchhoff's law to verify passive elements of electrical circuit	Arrange	K3
BS-PH191.CO3	Operate optical instruments to illustrate physical properties of light and to observe spectral lines of light to verify medium specific characteristics. Calculate Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant	Operate	K3
BS-PH191.CO4	Determine Band Gap and Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors. Determine the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.	Determine	K5
BS-PH191.CO5	Apply concepts of quantum mechanics to verify Bohr's atomic orbital theory	Apply	K3
BS-PH191.CO6	Determine Planck's constant and Stefan's constant applying modern Physics	Determine	K5

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	1	1	-	-	-	-	-	-	-	-	-	-
CO2	2	3	1	1	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	1	-	-	-	-	-	-	-	-	-	-
CO4	2	3	1	2	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	1	-	-	-	-	-	-	-	-	-	-
CO6	2	1	3	2	-	-	-	-	-	-	-	-	-	-
AVG.	2	2.33	2	1.33	0	0	0	0	0	0	0	0	0	0

Course Title: Basic Electrical Engineering Lab	**Code: ES-EE191**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 2P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-EE191.CO1	Calibrate Ammeter and Wattmeter	Calibrate	**K3**
ES-EE191.CO2	Demonstrate the measuring instrument and electrical machines	Demonstrate	K3
ES-EE191.CO3	Conduct open circuit and short circuit test of single-phase transformer	Conduct	K2
ES-EE191.CO4	Measure 3 phase power using two wattmeters	Measure	**K5**
ES-EE191.CO5	Identify the components of LT switchgear	Identify	K1
ES-EE191.CO6	Understand the characteristic of RLC series and parallel circuit	Understand	K2

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	3	-	-	-	2	-	-	-	-	-
CO2	2	3	3	1	2	-	-	-	3	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	2	-	-	-	-	-
CO4	2	-	2	-	3	-	-	-	3	-	-	-	-	-
CO5	1	-	-	-	1	-	-	-	-	-	-	-	-	-
CO6	2	1	2	1	3	-	-	-	2	-	-	-	-	-
AVG.	1.83	2	2.5	1	2.4	0	0	0	2.4	0	0	0	0	0

Course Title: Workshop	**Code: ES-ME192**
Type Of Course: Practical	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 1L+4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-ME192.CO1	Understanding the applications of hand tools and machine tools.	Understand	K2
ES-ME192.CO2	Comprehend the safety measures required to be taken while using the tools.	Comprehend	K2

ES-ME192.CO3	Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.	Select	K2
ES-ME192.CO4	Fabricate components with their own hands	Fabricate	K6
ES-ME192.CO5	Practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes	Analyze	K6
ES-ME192.CO6	Produce small devices of their interest, by assembling different components,	Produce	K6

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	1	-	1	-	-	-	-	-	-
CO3	1	-	-	-	-	1	-	1	1	-	-	-	-	-
CO4	1	-	-	-	-	-	2	-	2	1	1	-	-	1
CO5	1	-	-	-	-	-	2	-	2	1	1	1	-	-
CO6	1	-	-	-	-	-	2	-	2	1	2	1	-	1
AVG.	1	0	0	0	0	1	2	1	1.75	1	1.33	1	0	1

SEMESTER – II
THEORY

Course Title: Chemistry-I	**Code: BS-CH 201**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-CH 201.CO1	Apply first and second law of thermodynamics to different chemical and physical processes under specified condition to determine the equilibrium condition, spontaneity and thermo-chemical behaviour of a reaction.	Apply	K3
BS-CH 201.CO2	Using the concept of conductance of ions analyze the design and working principle of different electrochemical cells.	Use	K3
BS-CH 201.CO3	Derive rate of a reaction at a specified temperature under different medium	Derive	K4
BS-CH 201.CO4	Explain the mechanism considering the structure of the molecules and type of electronic effect present in them.	Explain	K5
BS-CH 201.CO5	Analyze different types of fuels for industrial application.	Analyze	K4
BS-CH 201.CO6	Distinguish different types of polymer for diverse application.	Distinguish	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO5	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO6	3	1	1	1	-	-	-	-	-	-	-	-	-	-
AVG.	3	1.66	1	1	0	0	0	0	0	0	0	0	0	0

Course Title:Mathematics –IIA	**Code: BS-M201**
Type of Course: Theory	**Course Designation: Compulsory**

Semester: 2nd	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-M201.CO1	Learn the basic mathematical tools to deal with problems of engineering sciences.	Learn	K1
BS-M201.CO2	Understand properties and application of Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.	Understand	K2
BS-M201.CO3	Analyze of physical or engineering problems.	Analyze	K4
BS-M201.CO4	Acquire problem solving skills related to engineering science.	Acquire	K2
BS-M201.CO5	Apply Linear Algebra, Ordinary Differential Equations (ODE) and Numerical analysis in real life problems.	Apply	K3
BS-M201.CO6	Classify ensembles and differentiate among Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.	Classify	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	-	-	-	-	-	-	-	3	1	-
CO2	2	2	3	1	-	-	-	-	-	-	-	3	2	-
CO3	3	3	3	1	-	-	-	-	-	-	-	3	1	-
CO4	3	2	3	2	-	-	-	-	-	-	1	3	3	1
CO5	3	2	3	2	-	-	-	-	-	-	2	3	3	-1
CO6	3	2	3	2	-	-	-	-	-	-	2	3	3	2
AVG.	2.83	2.17	3	1.5	0	0	0	0	0	0	1.67	3.00	2.17	1.33

Course Title:Programming for ProblemSolving	**Code: ES-CS201**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-CS201.CO1	Analyze the problem and formulate algorithms for them.	Analyze	K4
ES-CS201.CO2	Translate the algorithms to programs (in C language).	Understand	K2
ES-CS201.CO3	Understand the correct syntax of logical expression, branch instruction, iteration,	Understand	K2
ES-CS201.CO4	Apply array and pointer to solve problem.	Apply	K3
ES-CS201.CO5	Understand the use of , function, recursion.	Understand	K2
ES-CS201.CO6	Build analytical skill.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	3	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO4	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	3	3	3	2	1	1	1	1	1	2	2	2.33	2.33

Course Title:English	**Code: HM-HU201**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 2L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HM-HU201.CO1	Understand and apply English Speech Sounds for enhancing English Communication	Understand	K2
HM-HU201.CO2	Apply English Language Presentation Skill in Academic and in Professional Communication	Apply	K3
HM-HU201.CO3	Apply Receptive Skills of English in Academics and in Engineering Profession	Apply	K3

HM-HU201.CO4	Apply Writing Skill of English in Academics and in Profession	Apply	K3
HM-HU201.CO5	Apply Grammar Skill of English in Academic and in Professional Communication	Apply	K3
HM-HU201.CO6	Apply Critical Thinking Skill of English in Academic and in professionional Communication	Apply	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO2	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO3	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO4	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO5	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO6	2	2	2	2	2	2	-	2	-	3	-	2	1	1
AVG.	2	2	2	2	2	2	0	2	0	3	0	2	1	1

SEMESTER – II PRACTICAL

Course Title:Chemistry-I Laboratory	**Code: BS-CH291**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 3P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-CH291.CO1	Determine some physical parameter like viscosity of a solution and rate constant of a reaction	Determine	K5
BS-CH291.CO2	Determine the strength of an acid using conductometric method.	Determine	K5
BS-CH291.CO3	Determine the strength of an acid using pH metric method.	Determine	K5
BS-CH291.CO4	Determine partition coefficient of a compound	Determine	K5
BS-CH291.CO5	Estimate the amount of an ion present in a given solution using permanganometric and argentometric methods.	Estimate	K5
BS-CH291.CO6	Evaluate alkalinity (in terms of CaCO3 equvalent), hardness (in ppm) and amount of dissolved oxyzen (in mg/l) present in a given water sample using volumetric method.	Evaluate	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO2	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO3	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO4	1	2	2	3	-	-	-	-	-	-	-	-	-	-
CO5	1	2	2	3	-	-	-	-	-	-	-	-	-	-
CO6	1	2	2	3	-	-	-	-	-	-	-	-	-	-
AVG.	1	1.5	2	3	0	0	0	0	0	0	0	0	0	0

Course Title:Programming for ProblemSolving	**Code: ES-CS291**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-CS291.CO1	Analyze the problem and formulate algorithms for them.	Analyze	K4
ES-CS291.CO2	Translate the algorithms to programs (in C language).	Understand	K2
ES-CS291.CO3	Understand the correct syntax of logical expression, branch instruction, iteration,	Understand	K2
ES-CS291.CO4	Apply array and pointer to solve problem.	Apply	K3
ES-CS291.CO5	Understand the use of , function, recursion.	Understand	K2
ES-CS291.CO6	Build analytical skill.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO2	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO3	2	2	2	2	-	-	-	-	-	-	-	2	2	1

CO4	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO5	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO6	2	2	2	2	-	-	-	-	-	-	-	2	2	1
AVG.	2	2	2	2	0	0	0	0	0	0	0	2	2	1

Course Title:Engineering Graphics & Design	**Code: ES-ME291**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 2^{nd}	**Contact Hours: 1L+4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-ME291.CO1	Understand the applications of hand tools and machine tools.	Understand	K2
ES-ME291.CO2	Comprehend the safety measures required to be taken while using the tools.	Create	K6
ES-ME291.CO3	Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.	Evaluate	K5
ES-ME291.CO4	Fabricate components with their own hands.	Create	K6
ES-ME291.CO5	Confident on practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.	Understand	K2
ES-ME291.CO6	Produce small devices of their interest by assembling different components.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	1	-	1	-	-	-	-	-	-
CO3	1	-	-	-	-	1	-	1	1	-	-	-	-	-
CO4	1	-	-	-	-	-	2	-	2	1	1	-	-	1
CO5	1	-	-	-	-	-	2	-	2	1	1	1	-	-
CO6	1	-	-	-	-	-	2	-	2	1	2	1	-	1

AVG.	1	0	0	0	0	1	2	1	1.75	1	1.333	1	0	1.00

Course Title:Language Laboratory	**Code: HM-HU291**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 2P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HM-HU291.CO1	Understand and apply English Speech Sounds for enhancing English Communication	Understand	K2
HM-HU291.CO2	Apply English Language Presentation Skill in Academic and in Professional Communication	Apply	K3
HM-HU291.CO3	Apply Receptive Skills of English in Academics and in Engineering Profession	Apply	K3
HM-HU291.CO4	Apply Writing Skill of English in Academics and in Profession	Apply	K3
HM-HU291.CO5	Apply Grammar Skill of English in Academic and in Professional Communication	Apply	K3
HM-HU291.CO6	Apply Critical Thinking Skill of English in Academic and in professionional Communication	Apply	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO2	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO3	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO4	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO5	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO6	2	2	2	2	2	2	-	2	1	3	-	2	1	1
AVG.	2	2	2	2	2	2	0	2	1	3	0	2	1	1

SEMESTER – III
THEORY

Course: **ANALOG ELECTRONICS**	**Code: PC-EE 302**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**
PC-EE 302.CO1	Describe analog electronic components and analog electronics circuits	Explain	K2
PC-EE 302.CO2	Explain principle of operation of analog electronic components, filters, regulators and analog electronic circuits.	Define	K1
PC-EE 302.CO3	Compute parameters and operating points of analog electronic circuits.	Demonstrate	K2
PC-EE 302.CO4	Determine response of analog electronic circuits.	Explain	K2
PC-EE 302.CO5	Distinguish different types amplifier and different types oscillators based on application.	Build	K6
PC-EE 302.CO6	Construct operational amplifier based circuits for different applications.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	-	-	-	-	-	-	-	-	-	-	3	3	3
CO2	3	3	2	2	-	-	-	-	-	1	-	3	3	3
CO3	3	2	2	2	1	-	-	-	-	1	-	3	3	3
CO4	3	3	3	2	3	-	-	-	-	1	1	3	3	3
CO5	3	3	2	2	2	-	-	-	-	-	2	3	3	3
CO6	3	2	1	1	-	-	-	-	-	-	2	3	3	3
AVG.	3	2.6	2	1.8	2	0	0	0	0	1	1	3	3	3

Course Title: Electric Circuit Theory	Code: PC-EE301
Type of Course: Theory	Course Designation: Compulsory
Semester: 3rd	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-EE301.CO1	Describe different type of networks, sources and signals with examples.	Construct	K3
PC-EE301.CO2	Explain different network theorems, coupled circuit and tools for solution of networks.	Understand	K2
PC-EE301.CO3	Apply network theorems and different tools to solve network problems.	Categorize	K4
PC-EE301.CO4	Select suitable techniques of network analysis for efficient solution.	Learn	K3
PC-EE301.CO5	Estimate parameters of two-port networks.	Compare	K5
PC-EE301.CO6	Design filter circuits.	Learn	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	3	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO4	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	3	3	3	2	1	1	1	1	1	2	2.00	2.33	2.33

Course Title:Electromagnetic Field Theory	Code: PC-EE303
Type of Course: Theory	Course Designation: Compulsory

Semester: 3rd	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-EE303.CO1	Relate different coordinate systems for efficient solution of electromagnetic problems.	Illustrate	K2
PC-EE303.CO2	Describe mathematical s tools to solve electromagnetic problems.	Demonstrate	K2
PC-EE303.CO3	Explain laws applied to electromagnetic field.	Define	K1
PC-EE303.CO4	Apply mathematical tools and laws to solve electromagnetic problems.	Distinguish	K4
PC-EE303.CO5	Analyze electromagnetic wave propagation	Classify	K4
PC-EE303.CO6	Estimate transmission line parameters	Define	K1

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	-	-	-	-	3	2
CO2	3	3	3	3	3	-	-	-	-	-	1	-	3	2
CO3	3	3	3	1	3	-	-	-	-	-	2	-	1	3
CO4	3	2	3	3	2	-	-	-	-	-	1	-	2	3
CO5	3	2	3	3	-	-	-	-	-	-	2	2	3	3
CO6	3	3	3	2	3	-	-	-	-	-	3	3	3	3
AVG.	3	2.67	3	2.5	2.6	0	0	0	0	0	1.8	2.5	2.5	2.33

Course Title:Mathematics-III	**Code: BS-M 301**
Type of Course: Theory	**Course Designation: Compulsory**

Semester: 3rd	Contact Hours: 2L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-M 301.CO1	Explain basics of probability theories, rules, distribution and properties of Z transform	Apply	K3
BS-M 301.CO2	Describe different methods of numerical analysis.	Learn	K2
BS-M 301.CO3	Solve numerical problems based on probability theories , numerical analysis and Z transform	Apply	K3
BS-M 301.CO4	Apply numerical methods to solve engineering problem	Apply	K3
BS-M 301.CO5	Solve engineering problems using z transform and probability theory.	Solve	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO2	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO3	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO4	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO5	3	2	2	-	-	-	-	-	-	-	-	-	2	1
CO6	3	3	2	1	-	-	-	-	-	-	-	-	2	1
AVG.	3	3	2	1	0	0	0	0	0	0	0	0	2	1

Course Title: Indian Constitution	Code: MC-EE301
Type of Course: Theory	Course Designation: Compulsory
Semester: 3rd	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks

Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
MC-EE 301.CO1	Different features of Indian constitution.	Understand	K2
MC-EE 301.CO2	Power and functioning of Union, state and local self-government.	Apply	K3
MC-EE 301.CO3	Structure, jurisdiction and function of Indian Judiciary	Solve	K3
MC-EE 301.CO4	Basics of PIL and guideline for admission of PIL	Evaluate	K5
MC-EE 301 .CO5	Functioning of local administration starting from block to Municipal Corporation.	Analyze	K4
MC-EE 301.CO6	Identify authority to redress a problem in the profession and in the society.	Understand	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO2	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO3	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO4	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO5	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO6	2	2	2	2	-	2	-	1	-	-	3	1	1	1
AVG.	2	2	2	2	0	2	0	1	0	0	3	1	1	1

Course Title: ENGINEERING MECHANICS
Code: ES-ME 301
Type of Course: Theory
Course Designation: Compulsory
Semester: 3rd
Contact Hours: 3L/week
Continuous Assessment: 25 Marks
Final Exam: 70 Marks
Writer: Course Coordinator
Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-ME 301.CO1	explain the co-ordinate system, principle of three dimensional rotation, kinematics and kinetics of rigid bodies.	Understand	K2
ES-ME 301.CO2	elaborate the theory of general motion, bending moment, torsional motion and friction.	Apply	K3
ES-ME 301.CO3	develop free body diagram of different arrangements	Solve	K3
ES-ME 301.CO4	solve problems with the application of theories and principle of motion , friction and rigid bodies	Evaluate	K5
ES-ME 301.CO5	analyze torsional motion and bending moment.	Analyze	K4

Course Title: BIOLOGY FOR ENGINEERS	**Code: BS- 301**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS- 301.CO1	describe with examples the biological observations lead to major discoveries.	Understand	K2
BS- 301.CO2	explain the classification of kingdom of life the building blocks of life different techniques of bio physics used to study biological phenomena. the role of imaging in the screening, diagnosis, staging, and treatments of cancer.	Apply	K3
BS- 301.CO3	identify DNA as a genetic material in the molecular basis of information transfer	Solve	K3

BS- 301.CO4	analyze biological processes at the reductionistic level.	Evaluate	K5
BS- 301.CO5	apply thermodynamic principles to biological systems.	Analyze	K4
BS- 301.CO6	identify microorganisms.	Understand	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO2	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO3	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO4	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO5	2	2	2	2	-	2	-	1	-	-	3	1	1	1
CO6	2	2	2	2	-	2	-	1	-	-	3	1	1	1
AVG.	2	2	2	2	0	2	0	1	0	0	3	1	1	1

PRACTICAL

Course Title: Numerical Methods laboratory	**Code: PC-CS391**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 3^{rd}	**Contact Hours: 2Hr/week**
Continuous Internal Assessment:40	**External Assessment: 60**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-CS391.CO1	problems with Newton forward /backward, Lagrange's interpolation	Understand	K2
PC-CS391.CO2	problems of numerical integration using Trapezoidal rule, Simpson's 1/3 rule, Weddle's rule	Understand	K2

PC-CS391.CO3	problems to find numerical solution of a system of linear equations using Gauss elimination and Gauss-Seidel iterations.	Apply	K3
PC-CS391.CO4	problems to find numerical solution of Algebraic Equation by Regular- falsi and Newton Raphson methods.	Analyze	K4
PC-CS391.CO5	ordinary differential equation by Euler's and Runga-Kutta methods.	Identify	K3
PC-CS391.CO6	find appropriate numerical methods to solve engineering problems.	Design	K6
PC-CS391.CO7	use software package to solve numerical problems.		

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	1	0	0	-	-	-	1	3	3	3
CO2	3	3	3	1	1	0	0	-	-	1	1	3	3	3
CO3	3	3	3	-	-	0	0	1	-	1	1	3	3	3
CO4	3	3	2	2	1	0	0	1	2	1	1	3	3	3
CO5	3	2	1	-	2	0	0	2	2	1	1	3	3	3
CO6	3	2	2	-	2	0	0	2	2	-	1	3	3	3
AVG.	3	2.67	2.33	1.33	1.4	0	0	1.5	2	1	1	3.00	3.00	3

Course Title: Electric circuit theory Laboratory	**Code: PC-EE391**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 2Hr/week**
Continuous Internal Assessment:40	**External Assessment: 60**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

PC-EE391.CO1	Describe different type of networks, sources and signals with examples.	Construct	K3
PC-EE391.CO2	Explain different network theorems, coupled circuit and tools for solution of networks.	Understand	K2
PC-EE391.CO3	apply network theorems and different tools to solve network problems.	Categorize	K4
PC-EE391.CO4	Select suitable techniques of network analysis for efficient solution.	Learn	K3
PC-EE391.CO5	Estimate parameters of two-port networks.	Compare	K5
PC-EE391.CO6	Design filter circuits.	Understand	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	2	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	2	-	-	-	-	1	1	-	2	2	2
CO4	3	2	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	2	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	2.67	2.83	2.83	2	1	1	1	1	1	2	2	2.33	2.33

Course Title: Analog electronic laboratory	**Code: PC-EE392**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 2hr/week**
Continuous Internal Assessment: 40	**External Assessment: 60**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-EE392.CO1	Describe analog electronic components and analog electronics circuits	Understand	K2
PC-EE392.CO2	Explain principle of operation of analog electronic components, filters, regulators and analog electronic circuits.	Design	K6
PC-EE392.CO3	Compute parameters and operating points of analog electronic circuits.	Analyze	K4
PC-EE392.CO4	Determine response of analog electronic circuits.	Implement	K3
PC-EE392.CO5	Distinguish different types amplifier and different types oscillators based on application.	Design	K6
PC-EE392.CO6	Construct operational amplifier based circuits for different applications.	Implement	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3	3	1	2	3	3	2	2	3	1
CO2	3	3	1	2	1		1	2	3	3	2	2	-	1
CO3	3	3	2	2	2	1	1	2	2	2	1	3	2	1
CO4	3	3	2	2	2	1	1	2	2	2	2	3	1	3
CO5	3	3	3	2	3	1	1	2	2	2	1	3	-	1
CO6	3	3	3	2	3		1	2	3	3	2	3	3	2
AVG .	3	3	2.33	2	2.3	1.5	1	2	2.5	2.5	1.67	2.67	2.25	1.5

SEMESTER – IV
THEORY

Course Title: ELECTRIC MACHINE-I	Code: PC-EE-401
Type of Course: Theory	Course Designation: Compulsory
Semester: 4th	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Course Coordinator :	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-EE-401.CO1	Describe the function of different components of magnetic circuit, dc machines and transformers	Define	K1
PC-EE-401.CO2	Explain the principle of operation of different types of dc machines and transformers	Demonstrate	K2
PC-EE-401.CO3	Solve numerical problems of dc machines and transformers	Solve	K3
PC-EE-401.CO4	Estimate the parameters and efficiency of transformer.	Explain	K2
PC-EE-401.CO5	Determine the characteristics of dc machines	Classify	K4
PC-EE-401.CO6	Recommend methods to control output of dc machines	Apply	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	2	2	-	-	-	-	-	3	-	1
CO2	3	3	-	-	3	3	-	-	-	-	-	3	-	1
CO3	3	3	3	2	3	-	-	-	-	-	-	3	1	1
CO4	3	3	1	3	2	2	-	-	-	-	-	3	2	2
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO6	3	3	3	3	3	2	-	-	-	-	-	3	3	3
AVG.	3	3	2.5	2.75	2.6	2.25	0	0	0	0	0	3.00	2.25	1.84

Course Title: DIGITAL ELECTRONICS	Code: PC-EE-402
Type of Course: Theory	Course Designation: Compulsory

Semester: 4th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-EE-402.CO1	Describe the function of different building blocks of digital electronics, semiconductor memories and programmable logic devices.	Understand	K2
PC-EE-402.CO2	Explain the principle of operation of combinational and sequential digital circuits, A/D and D/A converter	Discuss	K6
PC-EE-402.CO3	Solve numerical problems of Boolean algebra, number system, combinational & sequential digital circuits and A/D and D/A converter	Illustrate	K2
PC-EE-402.CO4	Specify applications of combinational and sequential digital circuits.	Develop	K3
PC-EE-402.CO5	Determine specifications of different digital circuits.	Analyze	K4
PC-EE-402.CO6	Design combinational and sequential digital circuits	Explain	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	2	3
CO2	2	2	2	1	-	-	-	-	-	-	-	-	3	3
CO3	1	-	2	2	1	-	1	-	-	-	-	-	3	2
CO4	-	3	2	-	1	-	-	-	-	-	-	-	3	2
CO5	-	1	3	-	2	1	-	-	-	-	-	1	2	3
CO6	-	2	2	1	2	1	1	1	-	1	-	-	2	2
AVG.	1.67	2	2.2	1.33	1.5	1	1	1	0	1	0	1.00	2.50	2.5

Course Title: ELECTRICAL & ELECTRONICS MEASUREMENTS	**Code:** PC-EE-403
Type of Course: Theory	**Course Designation: Compulsory**

Semester: 4th	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Course Coordinator :	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-EE-403.CO1	Explain the terms accuracy, precision, resolution, speed of response, errors in measurement, loading effect	Write	K6
PC-EE-403.CO2	Describe methods of measurement of power, energy by instruments and resistance, capacitance and inductance by bridges and potentiometer	Design	K6
PC-EE-403.CO3	Explain the principle of operation of analog meters, instrument transformer, digital multimeter, digital voltmeter, digital frequency meter, signal generator, strain gauge, LVDT and temperature transducers	Determine	K5
PC-EE-403.CO4	Explain the different building block, principle of operation of oscilloscope and measurement techniques of voltage, current, frequency and phase by oscilloscope	Design	K6
PC-EE-403.CO5	Solve numerical problems related to analog meters, instrument transformer, measurement of power, energy, resistance, inductance and capacitance	Determine	K5
PC-EE-403.CO6	Specify applications of analog and digital measuring instruments, sensors and transducers	Write	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	-	-	3	3	2
CO2	3	3	2	2	2	-	-	-	-	-	-	3	3	2
CO3	3	1	2	2	2	-	-	-	-	-	-	3	2	2
CO4	3	2	2	2	3	-	-	-	-	-	1	3	2	3
CO5	3	3	2	2	3	-	-	-	-	-	2	3	2	2
CO6	3	3	2	2	3	-	-	-	-	-	2	3	2	2
AVG.	3	2.5	2.17	2	2.5	0	0	0	0	0	1.67	3	2.33	2.17

Course Title: THERMAL POWER ENGINEERING	Code: ES-EE-401
Type of Course: Theory	Course Designation: Compulsory
Semester: 4th	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Course Coordinator :	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-EE-401.CO1	Describe the function of different components of boilers. Engines and turbines	Analyze	K4
ES-EE-401.CO2	Explain the principle of operation of different types of boilers, turbines, ic engines and gas turbines.	Develop	K3
ES-EE-401.CO3	Solve numerical problems of boilers, turbines, ic engines and gas turbines.	Illustrate	K2
ES-EE-401.CO4	Analyze the performance of boilers, engines and turbines.	Discuss	K6
ES-EE-401.CO5	Determine efficiency of boilers, engines and turbines.	Understand	K2
ES-EE-401.CO6	Explain methods to control boiler, engines and turbines parameters.	Explain	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO3	3	3	3	3	2	-	-	-	-	-	-	-	3	1
CO4	3	3	3	2	2	-	-	-	-	-	-	-	3	2
CO5	3	3	3	1	1	-	2	-	-	-	-	-	2	3
CO6	3	3	3	2	2	2	1	-	-	-	-	-	2	3
AVG.	3	2.83	3	2	1.75	2	1.5	0	0	0	0	0	2.67	2.25

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Course Title: VALUES AND ETHICS IN PROFESSION	Code: HM-EE-401
Type of Course: Theory	Course Designation: Compulsory

Semester: 4th	**Contact Hours: 3Hrs/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HM-EE-401.CO1	Illustrate different aspects of human values, ethics, engineers' responsibility and duties	Describe	K1
HM-EE-401.CO2	Explain different principles, different theories and laws of engineering ethics and social experimentation	Explain	K2
HM-EE-401CO3	Identify different factors in the light of Engineers' responsibility towards safety and risk	Identify	K3
HM-EE-401.CO4	Correlate ethics of different work environment. Explain the need for intellectual property rights	Analyze	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	1	1	-	-	1	-	-	-	-	-	-	-	-
CO2	-	2	2	-	-	2	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO4	-	-	1	-	-	1	-	-	-	-	-	-	-	-
CO5	-	-	1	-	-	1	-	-	-	-	-	-	-	-
CO6	-	1	2	-	-	1	-	-	-	-	-	-	-	-
AVG.	0	1.33	1.4	0	0	1.16	0	0	0	0	0	0	0	0

Course Title: Environmental Sciences	**Code: MC-EE-401**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 1L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
MC-EE-401.CO1	Understand the natural environment and its relationships with human activities	Resolve	K3
MC-EE-401.CO2	Apply the fundamental knowledge of science and engineering to assess environmental and health risk	Solve	K3
MC-EE-401CO3	Develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations	Conceive	K2
MC-EE-401.CO4	Acquire skills for scientific problem-solving related to air, water, noise& land pollution.	Acquire	K1

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	1	-	-	1	2	-	-	-	-	-	-	-
CO2	-	2	1	-	-	1	2	-	-	-	-	-	-	-
CO3	-	2	2	-	-	2	1	-	-	-	-	-	-	-
CO4	-	2	1	-	-	1	2	-	-	-	-	-	-	-
CO5	-	2	1	-	-	1	2	-	-	-	-	-	-	-
CO6	-	1	1	-	-	1	1	-	-	-	-	-	-	-
AVG.	0	1.83	1.17	0	0	1.17	1.67	0	0	0	0	0	0	0

SEMESTER – IV PRACTICAL

Course Title: **ELECTRIC MACHINE-I LABORATORY**	Code: **PC-EE491**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 2Hrs/week**
Continuous Internal Assessment:40	**External Assessment: 60**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

PC-EE491.CO1	Identify appropriate equipment and instruments for the experiment.	Discuss	K6
PC-EE491.CO2	Test the instrument for application to the experiment.	Understand	K2
PC-EE491.CO3	Construct circuits with appropriate instruments and safety precautions	Analyze	K4
PC-EE491.CO4	Validate different characteristics of DC machine , methods of speed control of DC motor and parallel operation of the transformer	Illustrate	K2
PC-EE491.CO5	Work effectively in a team	Explain	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	2	2	1	-	-	0	-	-	-	-	2	3
CO2	2	2	2	1	1	-	-	0	-	-	-	-	2	2
CO3	2	1	2	2	-	-	-	0	1	-	-	-	2	2
CO4	3	3	3	2	-	-	-	0	1	-	-	-	3	2
CO5	3	2	2	1	1	2	2	0	1	-	-	1	2	2
CO6	3	2	3	2	1	2	1	0	1	1	2	2	3	3
AVG.	2.67	2	2.33	1.67	1	2	1.5	0	1	1	2	1.50	2.33	2.33

Course Title: DIGITAL ELECTRONICS LABORATORY	**Code: PC-EE492**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 4P/week**
Continuous Internal Assessment:40	**External Assessment: 60**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-EE492.CO1	Identify appropriate equipment and instruments for the experiment	Analyze	K4

PC-EE492.CO2	Test the instruments for application to the experiment	Understand	K2
PC-EE492.CO3	Construct decoder , multiplexer, adder and subtractor circuits with appropriate instruments and precaution	Examine	K4
PC-EE492.CO4	Realize RS-JK and D flip flop, universal register with gates, multiplexer and flip-flops and asynchronous and synchronous up down counters	Discuss	K6
PC-EE492.CO5	Validate the operation of code conversion circuit –BCD to Excess 3 & vice versa, 4 bit parity	Develop	K3
PC-EE492.CO6	Generator & comparator circuits	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	2
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	1
CO4	3	3	3	1	-	-	-	-	-	-	-	-	3	1
CO5	3	3	3	1	1	-	-	-	-	-	-	-	3	2
CO6	3	3	3	3	2	-	-	1	-	-	-	-	3	3
AVG.	3	3	3	1.67	1.5	0	0	1	0	0	0	0	3	1.8

Course Title: ELECTRICAL & ELECTRONICS MEASUREMENT LABORATORY	**Code: PC-EE493**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 4P/week**
Continuous Internal Assessment:40	**External Assessment: 60**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-EE493.CO1	Identify appropriate equipment and instruments for the experiment	Analyze	K4

PC-EE493.CO2	Test the instrument for application to the experiment	Understand	K2
PC-EE493.CO3	Construct circuits with appropriate instruments and safety precautions	Examine	K4
PC-EE493.CO4	Evaluate and adjust the precision and accuracy of AC energy meter, moving iron and dynamometer type ammeter, voltmeter and wattmeter by potentiometer	Discuss	K6
PC-EE493.CO5	Measure voltage, current, power, energy, phase , frequency, resistance, inductance, capacitance	Develop	K3
PC-EE493.CO6	Work Effectively In A Team	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	1	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	2
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	1
CO4	3	3	3	1	-	-	-	-	-	-	-	-	3	1
CO5	3	3	3	1	1	-	-	-	-	-	-	-	3	2
CO6	3	3	3	3	2	-	-	1	-	-	-	-	3	3
AVG.	3	3	3	1.67	1.5	0	0	1	0	0	0	0	3	1.8

University Syllabus :

Course Title: Thermal power Engg Laboratory	**Code: ES-ME-491**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 2Hrs/week**
Continuous Internal Assessment:40	**External Assessment: 60**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**

ES-ME-491.CO1	Identify appropriate equipment and instruments for the experiment	Analyze	K4
ES-ME-491.CO2	Construct experimental setup with appropriate instruments and safety precautions	Understand	K2
ES-ME-491.CO3	Indentify different parts of Lanchashire Boiler, Bahcock & Willcox Boiler, Cochran Boiler, Vertical Tubular Boiler, Locomotive Boiler, 4S Diesel Engine, 4S Petrol Engine, 2S Petrol engine	Examine	K4
ES-ME-491.CO4	Test 4 stroke petrol engine by electrical load box and diesel engine by electrical load box and rope brake dynamometer	Discuss	K6
ES-ME-491.CO5	Find calorific value, flash point, fire point, cloud point, pour point of fuel.work effectively in a team	Develop	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	1	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	2
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	1
CO4	3	3	3	1	-	-	-	-	-	-	-	-	3	1
CO5	3	3	3	1	1	-	-	-	-	-	-	-	3	2
CO6	3	3	3	3	2	-	-	1	-	-	-	-	3	3
AVG.	3	3	3	1.67	1.5	0	0	1	0	0	0	0	3	1.8

SEMESTER – V
THEORY

Course Title: Economics for Engineers	**Code: HU-501**
Type Of Course: Theory	**Course Designation: Compulsory**
Semester: 5^{th}	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HU-501.CO1	Evaluate the economic theories, cost concepts and pricing policies	Identify	K1
HU-501.CO2	Explain the market structures and integration concepts	Distinguish	K4
HU-501.CO3	Apply the concepts of financial management for project appraisal	Choose	K3
HU-501.CO4	Explain accounting systems , the impact of inflation, taxation, depreciation	Judge	K5
HU-501.CO5	Analyze financial statements using ratio analysis	Apply	K3
HU-501.CO6	Explain financial planning, economic basis for replacement, project scheduling, legal and Regulatory issues applied to economic investment and project-management problems	Design	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	1	-	-	-	-	2	3	3	2
CO2	3	3	2	2	2	-	1	-	-	1	-	3	3	2
CO3	3	1	3	2	2	1	-	-	-	-	-	3	2	2
CO4	3	2	2	2	3	2	-	-	-	-	1	3	3	3
CO5	3	3	2	2	3	-	1	1	-	-	2	3	3	3
CO6	3	3	2	2	3	-	-	-	-	-	2	3	2	2
AVG .	3	2.5	2.33	2	2.5	1.33	1	1	0	1	1.75	3.00	2.66	2.33

Course Title: ELECTRIC MACHINE-II	**Code: EE-501**
Type of Course: Theory	**Course Designation: Compulsory**

Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-501.CO1	Describe the arrangement of winding of ac machines.	Understand	K2
EE-501.CO2	Explain the principle of operation of induction machines, synchronous machines and special Machines.	Identify	K3
EE-501.CO3	Solve numerical problems of induction machines, synchronous machines and special machines.	Design	K6
EE-501.CO4	Estimate the parameters and efficiency of induction machines and synchronous machines.	Identify	K3
EE-501.CO5	Determine the characteristics of induction machines and synchronous machines.	Develop	K3
EE-501.CO6	Select appropriate methods for starting , braking and speed control of induction machines.	Develop	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	2	2	3	2	2	3	1
CO2	3	3	3	3	3	1	-	-	2	2	1	2	3	2
CO3	3	3	3	1	3	-	2	1	3	-	-	2	3	2
CO4	3	3	3	3	-	2	2	2	3	3	2	2	3	2
CO5	3	3	3	3	2	-	-	3	-	2	2	2	2	2
CO6	3	3	3	2	3	-	-	3	2	2	2	3	3	3
AVG.	3	3	3	2.5	2.6	1.5	2	2.2	2.4	2.4	1.8	2.6	2.83	2

Course Title: POWER SYSTEM-I	**Code: EE-502**
Type Of Course: Theory	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-502.CO1	Explain the principle of generation of electric power from different sources	Demonstrate	K2
EE-502.CO2	Determine parameters of transmission lines and its performance	Discuss	K6
EE-502.CO3	Explain the principle of formation of corona and methods of its reduction	Develop	K3
EE-502.CO4	Conduct electrical tests on insulators	Explain	K5
EE-502.CO5	Solve numerical problems related to overhead transmission line, cable, insulators and tariff	Analyze	K6
EE-502.CO6	Analyze overhead transmission line based on short medium and long lines.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	-	2	2	3	2	3	-	2	3	3
CO2	3	2	1	1	2	-	-	3	3	1	1	3	3	2
CO3	3	2	3	1	1	-	-	2	3	2	2	2	3	2
CO4	3	3	3	2	-	-	-	3	3	2	2	2	3	2
CO5	3	2	1	1	3	-	-	2	3	1	2	2	3	2
CO6	3	2	2	1	-	-	-	2	2	-	2	1	3	2
AVG.	3	2	1.83	1.167	2	2	2	2.5	2.667	1.8	1.8	2	3.00	2.17

Course Title: CONTROL SYSTEM-I	**Code: EE-503**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 4L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

EE-503.CO1	Develop mathematical model of mechanical, electrical, thermal, fluid system and different control system components like servomotors, synchros, potentiometer, tacho-generators etc.	Recall	K1
EE-503.CO2	Analyse stability of LTI system using routh-hurtwitz (RH) criteria, root locus techniques in time domain and bode plot and nyquist technique in frequency domain.	Discuss	K1
EE-503.CO3	Design different control law or algorithms like proportional control, proportional plus derivative(PD) control, proportional plus integration(PI) control, and proportional plus integration plus derivative (PID) control and compensators like lag, lead, lag-lead for LTI Systems.	Apply	K3
EE-503.CO4	Apply state variable techniques for analysis of linear systems.	Analyze	K4
EE-503.CO5	Analyze the stability of linear discrete system	Design	K6
EE-503.CO6	Solve numerical problems on LTI system modelling, responses, error dynamics and stability .	Justify	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	1	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	1	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG.	3	3	3	0	3	0	1	0	1	0	0	0	0	0

Course Title: MICROPROCESSOR & MICROCONTROLLER	**Code: EE-504C**
Type of Course: Theory	**Course Designation: Elective**
Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**

EE-504C.CO1	Explain the architecture of 8086 and 8051.	Understand	K2
EE-504C.CO2	Do assembly language programming of 8086, 8051	Apply	K3
EE-504C.CO3	Interface different peripheral with 8086 and 8051	Understand	K2
EE-504C.CO4	Develop micro processor/ microcontroller based systems.	Apply	K3
EE-504C.CO5	Compare microprocessor, microcontroller, PIC and ARM processors	Analyze	K4
EE-504C.CO6	Explain the architecture of 8086 and 8051.	Design	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	2	-	-	-	-	-	-	2	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	2
CO5	-	-	2	3	3	-	-	-	-	-	-	-	-	-
CO6	3	-	-	-	3	-	-	-	3	-	-	3	-	2
AVG.	3	2.5	2	3	3	0	0	0	2.5	0	0	3	2	2

Course Title: MICROPROCESSOR & MICROCONTROLER LABORATORY	**Code:** EE-594C
Type of Course: Theory	**Course Designation: Elective**
Semester: 5^{th}	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-594C.CO1	Identify appropriate equipment and instruments for the experiment	Understand	K2
EE-594C.CO2	Test the instrument for application to the experiment	Apply	K3
EE-594C.CO3	Construct circuits with appropriate instruments and safety precautions	Apply	K3

EE-594C.CO4	Program 8086 for arithmatic operation, sorting of array, searching for a number in a string and	Apply	K3
EE-594C.CO5	String manipulation	Apply	K3
EE-594C.CO6	Interface ADC/DAC, 8255, 8251 to 8086 and LCD, keyboard to 8051	Analyze	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	2	-	2	3	1	-	2	1	1
CO2	-	-	-	-	-	2	-	2	3	1	-	2	1	1
CO3	-	-	-	-	-	2	-	2	3	1	-	2	1	1
CO4	-	-	-	-	-	2	-	2	3	1	-	2	1	1
CO5	-	-	-	-	-	2	-	2	3	1	-	2	1	1
CO6	-	-	-	-	-	2	-	2	3	1	-	2	1	1
AVG.	0	0	0	0	0	2	0	2	3	1	0	2	1	1

Course Title: CONTROL SYSTEM-I LABORATORY	**Code:** EE-593
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 3P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-593.CO1	Identify appropriate equipment and instruments for the experiment.	Understand	K2
EE-593.CO2	Test the instrument for application to the experiment.	Extract	K2
EE-593.CO3	Construct circuits with appropriate instruments and safety precautions.	Choose	K3
EE-593.CO4	Use MAT-Lab control system tool box, MAT-Lab-simulink tool box & PSPICE for simulation of system	Develop	K6
EE-593.CO5	Validate step response & impulse response for type-0, type-1 & Type-2 system with unity Feedback using MATLAB & PSPICE.	Design	K6

EE-593.CO6	Determine control system specifications of first and second order systems.	Evaluate	K5

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	1	1	-	-	-	-	-	-	-	-	-	-
CO2	1	2	2	1	1		1	-	-	-	-	-	1	-
CO3	1	1	3	1	2	-	1	-	-	-	-	-	3	-
CO4	1	1	3	1	2	-	1	-	-	-	-	-	3	-
CO5	3	2	2	2	3	-	-	-	-	-	-	-	2	-
CO6	2	2	2	2	2	-	-	-	-	-	2	-	1	-
AVG.	1.66	1.83	2.16	1.33	2	0	1	0	0	0	2	0	2	0

Course Title: ELECTRIC MACHINE-II	**Code: EE-591**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 3P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-591.CO1	Identify appropriate equipment and instruments for the experiment.	Understand	K2
EE-591.CO2	Test the instrument for application to the experiment.	Demonstrate	K3
EE-591.CO3	Construct circuits with appropriate instruments and safety precautions.	Develop	K6
EE-591.CO4	Validate different characteristics of single phase Induction motor, three phase Induction	Determine	K5
EE-591.CO5	Motor, Induction generator and synchronous motor , methods of speed control of Induction	Analyse	K4
EE-591.CO6	Motors and parallel operation of the 3 phase Synchronous generator.	Illustrate	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

CO1	3	3	3	1	1	-	-	-	-	-	-	1	3	3
CO2	3	3	3	2	3	-	-	2	-	-	-	2	3	1
CO3	3	3	3	2	3	-	-	2	1	-	-	2	3	2
CO4	3	3	3	2	3	-	-	2	-	-	1	2	3	3
CO5	3	3	3	2	3	-	-	1	1	-	1	2	3	3
CO6	3	3	2	1	1	-	-	-	1	-	-	1	3	3
AVG.	3.00	3.00	2.83	1.67	2.33	0	0	1.75	1.00	0	1.00	1.67	3.00	2.50

Course Title: **POWER SYSTEM-I**	**Code:** **EE-592**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 3P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**
EE-592.CO1	Explain the principle of generation of electric power from different sources	Define	K1
EE-592.CO2	Determine parameters of transmission lines and its performance	Understand	K2
EE-592.CO3	Explain the principle of formation of corona and methods of its reduction	Develop	K3
EE-592.CO4	Conduct electrical tests on insulators	Apply	K3
EE-592.CO5	Solve numerical problems related to overhead transmission line, cable, insulators and tariff	Analyze	K4
EE-592.CO6	Analyze overhead transmission line based on short medium and long lines.	Develop	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	1	2	-	-	-	2	-	-	2	2	1
CO2	3	3	3	1	3	-	-	-	1	-	-	2	2	3
CO3	3	3	3	2	3	-	-	-	3	-	-	2	3	2

CO4	3	3	3	2	3	-	-	-	3	-	-	2	3	2
CO5	3	3	3	-	1	-	-	-	2	2	2	2	2	1
CO6	3	3	3	-	3	-	-	-	3	2	2	2	3	2
AVG.	3	3	3	1.5	2.5	0	0	0	2.3	2	2	2	2.5	1.8

SEMESTER – VI
THEORY

Course Title: PRINCIPLE OF MANAGEMENT	**Code: HU-601**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 2 hrs/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HU-601.CO1	Explain the concepts and approaches of management.	Describe	K1
HU-601.CO2	Demonstrate the roles, skills and functions of management.	Identify	K3
HU-601.CO3	Diagnose and solve organizational problems.	Evaluate	K5
HU-601.CO4	Identify the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities.	Understand	K2
HU-601.CO5	Apply different methods of Customer, Operation and Technology management.	Analyze	K4
HU-601.CO6	Acquire skills of good leader in an organization.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	1	1	-	-	-	-	-	-	1	2	-
CO2	2	-	2	2	-	-	1	-	-	-	-	-	2	-
CO3	-	2	2	2	2	-	-	2	-	-	1	-	3	1
CO4	1	3	3	1	2	-	-	-	-	-	-	-	3	2
CO5	1	2	-	2	1	-	-	-	-	-	2	-	2	-
CO6	2	2	2	2	2	3	-	-	-	-	-	-	2	1
AVG.	1.6	2.2	2.2	1.6	1.6	3	1	2	0	0	1.5	1.00	2.33	1.33

Course Title: CONTROL SYSTEM-II	Code: EE-602
Type of Course: Theory	Course Designation: Compulsory
Semester: 6th	Contact Hours: 4 hrs/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-602.CO1	Explain the principle of sampling and reconstrction of analog signal.	Describe	K1
EE-602.CO2	Perform Z-transformation and inverse Z-tranaformation of systems.	Explain	K2
EE-602.CO3	Analyse and design digital control systems.	Identify	K3
EE-602.CO4	Design compensators for digital control system to achieve desired specifications.	Simplify	K4
EE-602.CO5	Represent digital control systems using state space models.	Justify	K5
EE-602.CO6	Analyze the effect sampling on stability, controllability and observability.	Develop	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	2	2	-	-	-	-	-	-	3	3	2
CO2	3	2	1	2	2	-	-	-	-	-	-	3	3	2
CO3	3	2	-	2	2	-	-	-	-	-	-	3	2	2
CO4	3	3	2	2	3	-	-	-	-	-	1	3	2	3
CO5	2	3	2	2	3	-	-	-	-	-	2	3	2	2
CO6	2	3	2	2	3	-	-	-	-	-	2	3	2	2
AVG.	2.66	2.33	1.75	2	2.5	0	0	0	0	0	1.67	3.00	2.33	2.17

Course Title: POWER SYSTEM-II	**Code: EE-602**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 4hrs/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-602.CO1	Represent power system components in line diagrams.	Define	K1
EE-602.CO2	Determine the location of distribution substation.	Design	K6
EE-602.CO3	Determine the performance of power system with the help of load flow studies.	Evaluate	K5
EE-602.CO4	Analyse faults in Electrical systems.	Identify	K3
EE-602.CO5	Determine the stabilty of Power system.	Illustrate	K2
EE-602.CO6	Explain principle of operation of different power system protection equipments.	Examine	K4
EE-602.CO7	Solve numerical problems related to representation, load flow, faults, stabilty and protection of power system.	Examine	K7

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	2	1	-	-	-	-	-	-	1	-	3	1
CO2	3	2	3	1	-	1	1	-	-	-	1	1	3	-
CO3	3	2	-	1	2	1	-	-	1	-	-	1	3	2
CO4	3	3	3	1	2	1	-	-	1	1	-	2	2	3
CO5	2	3	2	3	1	-	-	1	3	1	-	1	3	2
CO6	2	3	2	3	2	1	1	2	3	-	1	2	2	1
AVG.	2.67	2.3	2.4	1.67	1.75	1	1	1.5	2	1	1	1.4	2.67	1.8

Course Title: **POWER ELECTRONICS**	Code:EE-603
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 6^{th}	**Contact Hours: 4hrs/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-603.CO1	Differentiate between signal level and power level devices.	Understand	K2
EE-603.CO2	Construct triggering and commutation circuits of SCR.	Remember	K1
EE-603.CO3	Explain the principle of operation of AC-DC, DC-DC and DC-AC converters.	Apply	K3
EE-603.CO4	Analysethe performance of AC-DC, DC-DC and DC-AC converters.	Analyse	K4
EE-603.CO5	Apply methods of voltage control and harmonic reduction to inverters.	Analyse	K4
EE-603.CO6	Solve numerical problems of switching devices, AC-DC, DC-DC and DC-AC converters.	Understand	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	-	-	3	3	2
CO2	3	3	2	2	2	-	-	-	-	-	-	3	3	2
CO3	3	1	2	2	2	-	-	-	-	-	-	3	2	2
CO4	3	2	2	2	3	-	-	-	-	-	1	3	2	3
CO5	3	3	2	2	3	-	-	-	-	-	2	3	2	2
CO6	3	3	2	2	3	-	-	-	-	-	2	3	2	2
AVG.	3	2.5	2.16	2	2.5	0	0	0	0	0	1.67	3	2.33	2.16

Course Title: **SOFTWARE ENGINEERING**	Code:EE-604(B)

Type of Course: Theory	**Course Designation: Elective**
Semester: 6th	**Contact Hours: 3hrs/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-604(B)CO1	Describe the Overview of system analysis & design: Business system concept, System development life cycle, waterfall model, Spiral Model, Feasibility Analysis, Technical feasibility, Cost- benefit Analysis, COCOMO model.	Describe	K1
EE-604(B).CO2	Explain the System design: Context diagram and DFD, Problem partitioning, Top down and bottom up design, decision tree, decision table and structured English, Functional Vs object oriented approach.	Explain	K2
EE-604(B).CO3	Analyze the Levels of testing, Integration testing, Test case specification, Reliability assessment, Validation & Verification metrics, Monitoring & control	Analyze	K4
EE-604(B).CO4	Explain the System project management: Project scheduling, Staffing, software configuration management, Quality assurance, Project monitoring.	Exemplify	K6
EE-604(B).CO5	Apply the Ssatic and dynamic models, necessity of modeling, UML diagrams, Class diagrams, Interaction diagrams, Collaboration diagram, Sequence diagram, State chart diagram, Activity diagram, Implementation diagram.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	1	1	-	-	-	2	1	3	2
CO2	3	3	2	2	2	1	1	-	-	-	2	1	3	2
CO3	3	3	2	2	2	1	1	-	-		2	1	3	2
CO4	3	3	2	2	2	1	1	-	-	-	1	1	3	2
CO5	3	3	2	2	2	1	1	-	-	-	2	1	3	2
CO6	3	3	2	2	2	1	1	-	-	-	2	1	3	2
AVG.	3	3	2	2	2	1	1	0	0	0	1.833	1	3	2

Course Title: DIGITAL SIGNAL PROCESSING	**Code: EE-605A**
Type of Course: Theory	**Course Designation: Elective**
Semester: 6th	**Contact Hours: 3hrs/week**

Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-605A.CO1	Represent signals mathematically in continuous and discrete-time and in the frequency domain.	Understand	K2
EE-605A.CO2	Analyse discrete-time systems using z-transform.	Understand	K2
EE-605A.CO3	Explain the Discrete-Fourier Transform (DFT) and the FFT algorithms.	Apply	K3
EE-605A.CO4	Design digital filters for various applications.	Evaluate	K5
EE-605A.CO5	Apply digital signal processing for the analysis of real-life signals.	Evaluate	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	-	-	-	-	2	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	2	-	2	-	-	2	-	-	2	-	-	-	-
CO4	-	-	-	-	2	-	-	3	-	-	-	2	-	2
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG.	0	2	0	2	2	0	2	2.5	0	2	0	2.5	2	2

Course Title: CONTROL SYSTEM-II LABORATORY	**Code: EE691**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 6^{th}	**Contact Hours: 2 hrs/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE691.CO1	Identify appropriate equipment and instruments for the experiment	Define	K1
EE691.CO2	Test the instrument for application to the experiment	Explain	K2
EE691.CO3	Construct circuits with appropriate instruments and safety precautions	Identify	K3
EE691.CO4	Design of Lead, Lag and Lead-Lag compensation circuit for the given plant transfer function. Analyze step response of the system by simulation.	Examine	K4
EE691.CO5	Performance analysis of a discrete time system using simulation tools. Study of closed response of a continuous system with a digital controller and sample and hold circuit by simulation.	Explain	K2
EE691.CO6	Work effectively in a team	Develop	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	1	-	2	3	3	2
CO2	3	3	2	2	2	-	-	-	1	-	2	3	3	2
CO3	3	1	2	2	2	-	-	-	1	-	2	3	3	2
CO4	3	2	2	2	3	-	-	-	1	-	2	3	3	2
CO5	-	-	-	-	-	-	-	3	1	-	-	3	2	3
CO6	3	3	2	2	3	-	-	-	1	-	2	3	2	3
AVG.	3	2.4	2.2	2	2.4	0	0	3	1	0	2	3.00	2.66	2.33

Course Title: POWER SYSTEM-II LABORATORY	**Code: EE692**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 2 hrs/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE692.CO1	Identify appropriate equipment and instruments for the experiment.	Analyze	K4
EE692.CO2	Test the instrument for application to the experiment.	Declare	K1
EE692.CO3	Construct circuits with appropriate instruments and safety precautions.	Retrieve	K3
EE692.CO4	Validate the characteristics of under voltage relay, over current relay, earth fault relay, on load time delay relay, off load time delay relay, CT and PT.	Describe	K1
EE692.CO5	Validate protection schemes of transformer, generator, motor and feeder.	Compile	K6
EE692.CO6	Apply software tools to find bus voltage, currents and power flows throughout the electrical system.	Explain	K2
EE692.CO7	Work effectively in a team	Develop	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	3	1	-	1	2	-	1	2	2	1
CO2	3	2	3	2	3	1	-	-	2	-	1	2	2	1
CO3	3	2	3	2	3	1	-	2	2	-	1	2	2	1
CO4	3	2	3	2	3	1	-	2	2	-	1	2	2	1
CO5	3	2	3	3	3	1	-	2	2	-	1	2	2	1
CO6	3	2	3	2	3	1	-	2	2	-	1	2	2	1
AVG.	3	2	3	3	3	1	0	1.8	2	0	1	2	2	1

Course Title: POWER ELECTRONICS LABORATORY	**Code: EE-693**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 2 hrs/week**

Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-693.CO1	Identify appropriate equipment and instruments for the experiment. .	Describe	K1
EE-693.CO2	Test the instrument for application to the experiment.	Explain	K2
EE-693.CO3	Construct circuits with appropriate instruments and safety precautions.	Develop	K3
EE-693.CO4	Validatecharacteristics of SCR, Triac, and performance of phase controlled converter, DC-DC converter, inverters and resonant pulse converters.	Generate	K4
EE-693.CO5	Demonstrate the relation between the speed and firing angle of Universal motor.	Explain	K5
EE-693.CO6	Work effectively in a team	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	-	3	-	-	-	2	-	3	-	3	3
CO2	3	2	3	-	3	-	-	-	0	-	3	-	3	1
CO3	3	2	3	-	3	-	-	-	2	-	3	3	3	1
CO4	3	2	3	-	3	-	-	-	2	-	3	3	3	2
CO5	3	2	3	-	3	-	-	-	0	-	3	0	3	3
CO6	3	2	3	-	3	-	-	-	3	-	3	3	3	3
AVG .	3	2	3	0	3	0	0	0	2.25	0	3	3	3	2.17

Course Title: Software engineering Laboratory	Code: EE 694A
Type of Course: Practical	**Course Designation: Elective**
Semester: 7^{th}	**Contact Hours: 2L/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**

Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE 694A.CO1	Explain the basic concepts of document for proposed project in standard format.	Explain	K2
EE 694A.CO2	Analyze the Project schedule preparation using tools like MSP project, Generation of Gnatt and PERT chart from schedule. Prepare project management plan in standard format..	Analyze	K4
EE 694A CO3	Analyze the case diagram, Class diagram, Sequence diagram and prepare Software design document using tools like Rational Rose.	Analyze	K4
EE 694A CO4	Explain the Estimate of project size using Function Point (FP)/Use Case Point. Use Excel/Open Office template for calculation.	Explain	K2
EE 694A CO5	Evaluate Test Script/Test Plan (both Black box and White Box approach) for a small component of the proposed project. (Develop that component using programming languages like c/Java/VB etc.)	Evaluate	K5
EE 694A.CO6	Explain the Generate test result and perform defect cause analysis using Pareto or Fishbone diagram.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	-	-	-	2	-	-	3	3	3
CO2	3	3	2	3	3	-	-	-	2	1	-	3	3	3
CO3	3	2	2	3	3	-	-	-	2	1	-	3	3	3
CO4	3	3	3	3	3	-	-	-	2	1	-	3	3	3
CO5	2	2	2	2	3	-	-	-	1	-	-	3	3	3
CO6	3	1	1	1	-	-	-	-	1	-	-	3	3	3
AVG.	2.83	2.33	2.167	2.5	3	0	0	0	1.67	1	0	3	3	3

SEMESTER – VII
THEORY

Course Title: Electric Drive	**Code: EE-701**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 7th	**Contact Hours: 4L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-701.CO1	Explain the principle of operation of electric drive	Explain	K2
EE-701.CO2	Describe different methods of starting and braking of electric drive.	Analyze	K4
EE-701.CO3	Model and control dc drive	Analyze	K4
EE-701.CO4	Control speed of induction and synchronous motors	Explain	K2
EE-701.CO5	Recommend drives for different applications	Evaluate	K5
EE-701.CO6	Estimate ratings, variables and parameters of electric drives.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	-	-	-	2	-	-	3	3	3
CO2	3	3	2	3	3	-	-	-	2	1	-	3	3	3
CO3	3	2	2	3	3	-	-	-	2	1	-	3	3	3
CO4	3	3	3	3	3	-	-	-	2	1	-	3	3	3
CO5	2	2	2	2	3	-	-	-	1	-	-	3	3	3
CO6	3	1	1	1	-	-	-	-	1	-	-	3	3	3
AVG.	2.83	2.33	2.167	2.5	3	0	0	0	1.67	1	0	3	3	3

Course Title: UTILISATION OF ELECTRIC POWER	**Code:** EE-702

Type of Course: Theory	**Course Designation: Elective**
Semester: 7th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-702.**CO1**	Explain the fundamentals of illumination and different lighting schemes.	Describe	K1
EE-702.**CO2**	Explain the fundamental of Electrolytic processes, Electric heating and Welding.	Explain	K2
EE-702.**CO3**	Able to select appropriate lighting, heating and welding techniques for specific applications.	Analyze	K4
EE-702.**CO4**	Apply different electrolysis process for different applications.	Understand	K2
EE-702.**CO5**	Explain the principle of different aspect of Electric traction and control of traction motor.	Apply	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	2	-	-	-	-	-	-	2	2	2
CO2	3	3	2	3	2	-	-	-	-	-	-	1	2	2
CO3	3	3	2	3	2	-	-	-	-	-	-	2	2	2
CO4	3	3	2	3	2	-	-	-	-	-	-	2	2	2
CO5	3	3	2	3	2	-	-	-	-	-	-	1	2	2
CO6	3	3	2	3	2	-	-	-	-	-	-	1	2	2
AVG.	3	3	2	3	2	0	0	0	0	0	0	1.5	2	2

Course Title: Power System III	**Code:** EE-703A
Type of Course: Theory	**Course Designation: Elective**
Semester: 7th	**Contact Hours: 4L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-703A.**CO1**	Explain the principle of generation of electric power from different sources	Discuss	K6
EE-703A.**CO2**	Determine parameters of transmission lines and its performance	Understand	K2
EE-703A.**CO3**	Explain the principle of formation of corona and methods of its reduction	Illustrate	K2
EE-703A.**CO4**	Conduct electrical tests on insulators	Analyze	K4
EE-703A.**CO5**	Solve numerical problems related to overhead transmission line, cable, insulators and tariff	Develop	K3
EE-703A.**CO6**	Analyze overhead transmission line based on short medium and long lines.	Explain	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	-	-	3	3	2
CO2	3	3	2	2	2	-	-	-	-	-	-	3	3	2
CO3	3	1	2	2	2	-	-	-	-	-	-	3	2	2
CO4	3	2	2	2	3	-	-	-	-	-	1	3	2	3
CO5	3	3	2	2	3	-	-	-	-	-	2	3	2	2
CO6	3	3	2	2	3	-	-	-	-	-	2	3	2	2
AVG.	3	2.5	2.17	2	2.5	0	0	0	0	0	1.67	3	2.33	2.17

Course Title: Renewable & Non-Conventional Energy	**Code: EE-704D**
Type of Course: Theory	**Course Designation: Elective**
Semester: 7^{th}	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-704D.CO1	Describe the basic concept of linear programming problem and various component of LPP formulation for solving Business Problems.	Describe	K1

EE-704D.CO2	Identify different approaches for solving LPP problems such as Graphical Method, Simplex Method, Charnes' Big-M Method, Duality Theory, Transportation Problems and Assignment Problems etc.	Identify	K3
EE-704D.CO3	Evaluate the applications of game theory such as 2-Person Zero-sum Game; Saddle Point; Mini-Max and Maxi-Min Theorems, Games without Saddle Point; Graphical Method; Principle of Dominance etc.	Evaluate	K5
EE-704D.CO4	Understand the terms Feasible Solution, Basic and non- basic Variables, Basic Feasible Solution, Degenerate and Non-degenerate Solution, Convex set and the use of game theory.	Understand	K2
EE-704D.CO5	Analyze different types of algorithms such as Floyd Algorithm, PERT- CPM etc. for Cost Analysis, Crashing, and Resource Allocation.	Analyze	K4
EE-704D.CO6	Explain the concepts of Queuing Theoryalong with the some models such as Axiomatic Derivation of the Arrival & Departure (Poisson Queue), Poisson Queue Models: (M/M/1): (∞ / FIFO) and (M/M/1: N / FIFO) etc.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
CO1	2	2	-	1	1	-	-	-	2	-	2	2	2	1
CO2	2	2	-	2	-	-	-	-	2	-	2	-	3	2
CO3	2	2	1	2	1	-	-	-	2	-	2	-	2	1
CO4	1	2	1	2	-	-	-	-	1	-	1	2	2	1
CO5	1	2	-	2	-	-	-	-	1	-	2	-	3	2
CO6	1	1	-	1	-	-	-	-	-	-	1	-	2	-
AVG.	1.5	1.83	1	1.67	1	0	0	0	1.6	0	1.67	2	2.33	1.4

Course Title: COMPUTER NETWORKS	**Code:** EE-705A
Type of Course: Theory	**Course Designation: Elective**
Semester: 7th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**

EE-705A.**CO1**	Explain the concepts of data communication and networking.	Learn	K1
EE-705A.**CO2**	Identify the different types of network topologies and protocols.	Understand	K2
EE-705A.**CO3**	Describe the function of a network system with OSI and TCP/IP model.	Design	K6
EE-705A.**CO4**	Differentiate different types of routing protocol	Compare	K4
EE-705A.**CO5**	Apply principles of congestion control .	Explain	K2
EE-705A.**CO6**	Implement different schemes for security of the networks	Develop	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
CO2	-	-	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	2	1	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	1	-	-	-	-	-	-	-	1	-
CO5	-	-	-	2	1	-	-	-	-	-	-	-	1	-
CO6	-	-	3	2	1	-	-	-	-	-	-	-	1	2
AVG.	0	0	3	2	1	0	0	0	0	0	0	0	1	1.5

Course Title: Electric Drive Laboratory	**Code:** EE-791
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 7th	**Contact Hours: 2Hrs/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**
EE-791.**CO1**	Identify appropriate equipment and instruments for the experiment.	Examine	K3
EE-791.**CO2**	Test the instrument for application to the experiment.	Describe	K1

EE-791.**CO3**	Construct circuits with appropriate instruments and safety precautions.	Compare	K4
EE-791.**CO4**	Apply different methods of control of Electric Drive in the laboratory.	Evaluate	K5
EE-791.**CO5**	Analyse experimental data obtained in the laboratory.	Describe	K1
EE-791.**CO6**	Work effectively in a team	Explain	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	-	-	-	3	3	1
CO2	3	3	3	3	3	-	-	-	-	-	-	2	3	2
CO3	3	3	3	1	3	1	1	-	-	-	-	3	3	2
CO4	3	3	3	3		-	-	-	-	-	-	3	3	2
CO5	3	3	3	3	2	-	-	-	-	-	-	3	2	2
CO6	3	3	3	2	3	2	2	-	-	-	1	3	3	3
AVG.	3	3	3	2.5	2.6	1.5	1.5	0	0	0	1	2.83	2.83	2

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Course Title: Computer network laboratory	**Code: EE-792A**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 7^{th}	**Contact Hours: 3 Hrs/week**
Continuous Assessment: 40Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-792A.CO1	**Explain the concepts of data communication and networking.**	Identify	K3
EE-792A.CO2	**Identify the different types of network topologies and protocols.**	Understand	K2
EE-792A.CO3	**Describe the function of a network system with OSI and TCP/IP model.**	Understand	K2
EE-792A.CO4	**Differentiate different types of routing protocol.**	Identify	K3

EE-792A.CO5	**Explain the concepts of data communication and networking.**	Prepare	K6
EE-792A.CO6	**Identify the different types of network topologies and protocols.**	Develop	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	3	3	3	3	3	-	-	-	2	2	2	3
CO2	2	3	3	3	1	2	3	-	-	-	-	-	1	3
CO3	2	2	-	2	3		-	-	-	-	-	-	3	1
CO4	2	2	-	2	3	-	-	-	-	-	-	-	2	2
CO5	1	1	1	2	2	-	-	-	-	-	-	-	2	1
CO6	1	1	1	2	-	2	2	2	2	-	2	-	1	2
AVG.	1.66	2	2	2.33	2.4	2.33	2.66	2	2	0	2	2	1.83	2

SEMESTER – VIII
THEORY

Course Title: SENSORS & TRANSDUCERS	**Code:** EE-802B
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**
EE-802B.**CO1**	Describe conceptual understanding of network security issues, challenges and mechanisms common network vulnerabilities and attacks and basic concept of cryptography.	Describe	K1
EE-802B.**CO2**	Evaluate various techniques of cryptography.	Evaluate	K5
EE-802B.**CO3**	Illustrate the algorithms of different key symmetric cryptography.	Illustrate	K2
EE-802B.**CO4**	Apply the public key algorithms, digital signature and message digest.	Apply	K3
EE-802B.**CO5**	Analyze the approaches of security and protocol authentication.	Analyze	K4
EE-802B.**CO6**	Explain the concept of electronic mail security and types of firewall and its configurations.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	-	-	-	-	-	-	-	-	1	3	3
CO2	3	3	3	-	2	-	-	-	-	-	-	-	3	2
CO3	2	2	1	2	3	1	-	1	1	3	-	-	3	2
CO4	3	3	2	2	3	1	2	1	0	2	-	-	3	2
CO5	3	2	3	2	1	-	-	-	-	1	-	-	2	2
CO6	3	2	3	2	2	2	-	-	-	-	-	-	2	2
AVG.	2.83	2.5	2.33	2	2.2	1.33	2	1	0.5	2	0	1	2.67	2.167

Course Title: Organisational Behaviour
Code: HU801
Type of Course: Theory
Course Designation: Elective
Semester: 8th
Contact Hours: 2hrs/week
Continuous Assessment: 25 Marks
Final Exam: 70 Marks

Writer: Course Coordinator
Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HU801A.CO1	Definition, Importance, Historical Background, Fundamental Concepts of OB, Challenges and Opportunities for OB.	Describe	K1
HU801A.CO2	Evaluate Personality and Attitudes: Meaning of personality, Personality Determinants and Traits, Development of Personality, Types of Attitudes, Job Satisfaction.	Evaluate	K5
HU801A.CO3	Illustrate Perception: Definition, Nature and Importance, key Factors influencing Perception, Perceptual Selectivity, Link between Perception and Decision Making.	Illustrate	K2
HU801A.CO4	Apply the Motivation: Definition, Theories of Motivation - and Maslow's Hierarchy of Needs Theory	Apply	K3
HU801A.CO5	Analyze McGregor's Theory X & Y, Herzberg's Motivation- and Hygiene Theory, Alderfer's ERG Theory, McClelland's Theory of Needs,	Analyze	K4
HU801A.CO6	Apply the Organizational Design: Various Organizational Structures and their Effects on Human Behaviour, Concepts of Organizational Climate and Organizational Culture.	Explain	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	1	3	3
CO2	3	3	3	-	2	-	-	-	-	-	-	-	3	2
CO3	2	2	1	2	3	1	-	1	1	3	-	-	3	2
CO4	3	3	2	2	3	1	2	1	0	2	-	-	3	2
CO5	3	2	3	2	1	-	-	-	-	1	-	-	2	2
CO6	3	2	3	2	2	2	-	-	-	-	-	-	2	2
AVG.	2.83	2.5	2.33	2	2.2	1.33	2	1	0.5	2	0	1	2.67	2.167

Course Title: HVDC TRANSMISSION	**Code: EE-801A**
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-801A.CO1	Choose intelligently AC and DC transmission systems for the dedicated application(s).	Understand	K2
EE-801A.CO2	Identify the suitable two-level/multilevel configuration for high power converters.	Determine	K5
EE-801A.CO3	Select the suitable protection method for various converter faults.	Use of	K3
EE-801A.CO4	Identify suitable reactive power compensation method.	Analysed	K4
EE-801A.CO5	Decide the configuration for harmonic mitigation on both AC and DC sides..	Understand	K2
EE-801A.CO6	Solve numerical problems related to converters, power flow analysis, reactive power control.	Build	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	3	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO4	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	3	3	3	2	1	1	1	1	1	2	2	2.33	2.33

Course Title: ENERGY MANAGEMENT & AUDIT	**Code: EE-801C**
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-801C.CO1	Explain the basic of energy resources, energy security, energy conservation and pollution.	Understand	K2
EE-801C.CO2	The energy conservation opportunities in different thermal systems	Analyze	K4
EE-801C.CO3	Quantify the energy conservation opportunities in different electrical systems	Design	K6
EE-801C.CO4	Identify the common energy conservation opportunities in different energy intensive industrial equipments	Explain	K2
EE-801C.CO5	Explain the methods of energy management and audit.	Design	K6
EE-801C.CO6	Analyse and report the outcome of energy audit.	Implement	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	-	-	3	3	2
CO2	3	3	2	2	2	-	-	-	-	-	-	3	3	2
CO3	3	1	2	2	2	-	-	-	-	-	-	3	2	2
CO4	3	2	2	2	3	-	-	-	-	-	1	3	2	3
CO5	3	3	2	2	3	-	-	-	-	-	2	3	2	2
CO6	3	3	2	2	3	-	-	-	-	-	2	3	2	2
AVG.	3	2.5	2.16667	2	2.5	0	0	0	0	0	1.6667	3	2.33	2.166

SESSIONAL

Course Title: Project	**Code: EE-881**
Type of Course: Sessional	**Course Designation: Compulsory**
Semester: 8th	**Contact Hours: NA**
Continuous Assessment: NA	**Final Exam: 100 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

EE-881.CO1	Understand the underlying technical concepts and theory.	Understand	K2
EE-881.CO2	Practice hands on experience to build the basic models	Apply	K3
EE-881.CO3	Develop mathematical generalize of the solution	Create	K6
EE-881.CO4	Integrate all the parts and deployment of the project	Apply	K3
EE-881.CO5	Prepare a Dissertation and Presentation in the standard format for being evaluated by the Department.	Create	K6
EE-881.CO6	Prepare a paper for Conference presentation/Publication in Journals, if possible.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	2	2	1	1	-	-	-	-	-	3	1
CO2	2	2	3	3	3	1	-	-	-	-	-	-	3	1
CO3	3	3	3	2	1	-	1	-	-	-	-	-	2	3
CO4	2	2	2	2	2	-	-	-	2	2	2	2	2	3
CO5	2	-	2	-	2	-	-	2	3	3	3	3	2	3
CO6	2	-	2	-	2	-	-	2	3	3	3	3	2	3
AVG.	2	2.25	2.16	2.25	2	1	1	2	2.66	2.66	2.66	2.66	2.33	2.33

Course Title: ELECTRICAL SYSTEMS LABORATORY-II	**Code: EE-882**
Type of Course: Sessional	**Course Designation: Elective**
Semester: 8th	**Contact Hours: NA**
Continuous Assessment: NA	**Final Exam: 100 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-882.CO1	Designing a heating element with specified wattage	Understand	K2
EE-882.CO2	Learning and Design the control circuit	Determine	K5
EE-882.CO3	Design a controller for speed control of DC machine.	Use of	K3
EE-882.CO4	Modification and Design the control circuit	Analysed	K4
EE-882.CO5	Designing of a substation	Understand	K2

EE-882.CO6	Design a controller for speed control of AC machine	Build	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	3	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO4	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	3	3	3	2	1	1	1	1	1	2	2	2.33	2.33

Course Title: Grand Viva	**Code: EE-883**
Type of Course: Sessional	**Course Designation: Compulsory**
Semester: 8th	**Contact Hours: NA**
Continuous Assessment: NA	**Final Exam: 100 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
EE-883.CO1	Analyze and apply the entire knowledge of electrical engineering	Understand	K2
EE-883.CO2	Revision all the important topics of electrical engineering	Determine	K5
EE-883.CO3	Develop a whole knowledge in the domain	Use of	K3
EE-883.CO4	Deal with core technical question	Analysed	K4
EE-883.CO5	Scaling the total course outcome	Understand	K2
EE-883.CO6	Evaluated the domain knowledge.	Build	K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	3	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	3	-	-	-	-	1	1	-	2	2	2

CO4	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	3	3	3	2	1	1	1	1	1	2	2	2.33	2.33

Grand Viva Voce covering the whole syllabus

MECHANICAL ENGINEERING
SEMESTER – I
THEORY

Course Title: Mathematics –IA	**Code: BS-M101**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-M101.CO1	Learn the basic mathematical tools to deal with problems of engineering sciences.	Learn	Level I
BS-M101.CO2	Understand properties and application of Calculus and Linear Algebra .	Understand	Level II
BS-M101.CO3	Analyze of physical or engineering problems.	Analyze	Level IV
BS-M101.CO4	Acquire problem solving skills related to engineering science.	Acquire	Level II
BS-M101.CO5	Apply Calculus and Linear Algebra in real life problems.	Apply	Level III
BS-M101.CO6	Classify ensembles and differentiate between Calculus and Linear Algebra.	Classify	Level IV

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	2
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	1
CO3	3	3	3	2	-	-	-	-	-	-	-	3	2	1
CO4	3	1	2	1	-	-	-	-	-	-	1	3	2	2
CO5	2	2	2	2	-	-	-	-	-	-	2	3	1	-
CO6	3	2	2	2	-	-	-	-	-	-	2	3	-	-
AVG.	2.83	2.33	2.5	2.33	0	0	0	0	0	0	1.6667	3	2	1.5

Course Title: Physics-I	**Code: BS-PH101**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3L+1T/week**

Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

Course Outcomes	Details	Action Verb	Knowledge Level
BS-PH101.CO1	Apply basic concepts of mechanics	Apply	K3
BS-PH101.CO2	Discuss Physical optics and analyze principles of lasers with applications	Discuss	K6
BS-PH101.CO3	Categorize di electric and magnetic properties of materials leading to Electromagnetic laws	Categorize	K4
BS-PH101.CO4	Differentiate between Classical Physics and Quantum Physics by introducing Planck's law	Differentiat e	K5
BS-PH101.CO5	Apply wave particle duality in real life problems followed by simple quantum mechanics calculations	Apply	K3
BS-PH101.CO6	Classify ensembles and differentiate between classical and Quantum statistical mechanics	Classify	K4

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO5	1	3	2	0	-	-	-	-	-	-	-	-	-	-
CO6	-	1	3	2	-	-	-	-	-	-	-	-	-	-
AVG .	1.80	2.33	1.83	1.00	0	0	0	0	0	0	0	0	0	0

Course Title: Basic Electrical Engineering	**Code: ES-EE101**
Type Of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

ES-EE101.CO1	**Understand and analyze basic electric and magnetic circuits.**	**Understand**	**K2**
ES-EE101.CO2	**Study the working principles of electrical machines and power converters.**	**Study**	**K1**
ES-EE101.CO3	**Introduce the components of low voltage electrical installations.**	**Introduce**	**K1**
ES-EE101.CO4	**Understand the general structure of electrical power system.**	**Understand**	**K2**
ES-EE101.CO5	**Understand the construction and operation of single-phase transformer.**	**Understand**	**K2**
ES-EE101.CO6	**Explain the working principle of power converters.**	**Explain**	**K2**

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO2	2	3	3	2	2	-	-	-	-	-	-	-	-	-
CO3	2	-	3	1	-	-	-	-	-	-	-	1	-	-
CO4	2	-	2	2	3	-	-	-	-	-	-	2	-	-
CO5	2	2	-	2	3	-	-	-	-	-	-	1	-	-
CO6	2	1	3	3	3	-	-	-	-	-	-	1	-	-
AVG.	2.17	2	2.75	2	2.6	0	0	0	0	0	0	1.25	0	0

PRACTICAL

Course Title: Physics-I Laboratory	**Code: BS-PH191**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

BS-PH191.CO1	**Observe and read data in slide calliper's, screw gauge. Calculate different modulus of elasticity to apply basic knowledge Physics of Elasticity and apply viscosity principle of streamline motion of water to calculate its viscosity coefficient required in fluid mechanics**	**Observe**	**K1**
BS-PH191.CO2	**Arrange sequential connection in electrical experiment to verify principles of Kirchhoff's law to verify passive elements of electrical circuit**	**Arrange**	**K3**
BS-PH191.CO3	**Operate optical instruments to illustrate physical properties of light and to observe spectral lines of light to verify medium specific characteristics. Calculate Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant**	**Operate**	**K3**
BS-PH191.CO4	**Determine Band Gap and Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors. Determine the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.**	**Determine**	**K5**
BS-PH191.CO5	**Apply concepts of quantum mechanics to verify Bohr's atomic orbital theory**	**Apply**	**K3**
BS-PH191.CO6	**Determine Planck's constant and Stefan's constant applying modern Physics**	**Determine**	**K5**

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	1	1	-	-	-	-	-	-	-	-	-	-
CO2	2	3	1	1	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	1	-	-	-	-	-	-	-	-	-	-
CO4	2	3	1	2	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	1	-	-	-	-	-	-	-	-	-	-
CO6	2	1	3	2	-	-	-	-	-	-	-	-	-	-
AVG.	2	2.33	2	1.33	0	0	0	0	0	0	0	0	0	0

Course Title: Basic Electrical Engineering Lab	**Code: ES-EE191**
Type of Course: Practical	**Course Designation: Compulsory**

Semester: 1st	**Contact Hours: 2P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-EE191.CO1	Calibrate Ammeter and Wattmeter	Calibrate	K3
ES-EE191.CO2	Demonstrate the measuring instrument and electrical machines	Demonstrate	K3
ES-EE191.CO3	Conduct open circuit and short circuit test of single-phase transformer	Conduct	K2
ES-EE191.CO4	Measure 3 phase power using two wattmeters	Measure	K5
ES-EE191.CO5	Identify the components of LT switchgear	Identify	K1
ES-EE191.CO6	Understand the characteristic of RLC series and parallel circuit	Understand	K2

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	3	-	-	-	2	-	-	-	-	-
CO2	2	3	3	1	2	-	-	-	3	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	2	-	-	-	-	-
CO4	2	-	2	-	3	-	-	-	3	-	-	-	-	-
CO5	1	-	-	-	1	-	-	-	-	-	-	-	-	-
CO6	2	1	2	1	3	-	-	-	2	-	-	-	-	-
AVG.	1.83	2	2.5	1	2.4	0	0	0	2.4	0	0	0	0	0

Course Title: Workshop	**Code: ES-ME192**
Type Of Course: Practical	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 1L+4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-ME192.CO1	Understanding the applications of hand tools and machine tools.	Understand	K2
ES-ME192.CO2	Comprehend the safety measures required to be taken while using the tools.	Comprehend	K2
ES-ME192.CO3	Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.	Select	K2
ES-ME192.CO4	Fabricate components with their own hands	Fabricate	K6
ES-ME192.CO5	Practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes	Analyze	K6
ES-ME192.CO6	Produce small devices of their interest, by assembling different components,	Produce	K6

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	1	-	1	-	-	-	-	-	-
CO3	1	-	-	-	-	1	-	1	1	-	-	-	-	-
CO4	1	-	-	-	-	-	2	-	2	1	1	-	-	1
CO5	1	-	-	-	-	-	2	-	2	1	1	1	-	-
CO6	1	-	-	-	-	-	2	-	2	1	2	1	-	1
AVG.	1	0	0	0	0	1	2	1	1.75	1	1.33	1	0	1

SEMESTER – II
THEORY

Course Title: Chemistry-I	Code: BS-CH 201
Type of Course: Theory	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 3L+1T/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-CH 201.CO1	Apply first and second law of thermodynamics to different chemical and physical processes under specified condition to determine the equilibrium condition, spontaneity and thermo-chemical behaviour of a reaction.	Apply	K3
BS-CH 201.CO2	Using the concept of conductance of ions analyze the design and working principle of different electrochemical cells.	Use	K3
BS-CH 201.CO3	Derive rate of a reaction at a specified temperature under different medium	Derive	K4
BS-CH 201.CO4	Explain the mechanism considering the structure of the molecules and type of electronic effect present in them.	Explain	K5
BS-CH 201.CO5	Analyze different types of fuels for industrial application.	Analyze	K4
BS-CH 201.CO6	Distinguish different types of polymer for diverse application.	Distinguish	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO5	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO6	3	1	1	1	-	-	-	-	-	-	-	-	-	-
AVG.	3	1.66	1	1	0	0	0	0	0	0	0	0	0	0

Course Title:Mathematics –IIA	Code: BS-M201
Type of Course: Theory	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 3L+1T/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-M201.CO1	Learn the basic mathematical tools to deal with problems of engineering sciences.	Learn	K1
BS-M201.CO2	Understand properties and application of Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.	Understand	K2
BS-M201.CO3	Analyze of physical or engineering problems.	Analyze	K4
BS-M201.CO4	Acquire problem solving skills related to engineering science.	Acquire	K2
BS-M201.CO5	Apply Linear Algebra, Ordinary Differential Equations (ODE) and Numerical analysis in real life problems.	Apply	K3
BS-M201.CO6	Classify ensembles and differentiate among Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.	Classify	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	-	-	-	-	-	-	-	3	1	-
CO2	2	2	3	1	-	-	-	-	-	-	-	3	2	-
CO3	3	3	3	1	-	-	-	-	-	-	-	3	1	-
CO4	3	2	3	2	-	-	-	-	-	-	1	3	3	1
CO5	3	2	3	2	-	-	-	-	-	-	2	3	3	-1
CO6	3	2	3	2	-	-	-	-	-	-	2	3	3	2
AVG.	2.83	2.17	3	1.5	0	0	0	0	0	0	1.67	3.00	2.17	1.33

Course Title:Programming for ProblemSolving	Code: ES-CS201
Type of Course: Theory	Course Designation: Compulsory

Semester: 2nd	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-CS201.CO1	Analyze the problem and formulate algorithms for them.	Analyze	K4
ES-CS201.CO2	Translate the algorithms to programs (in C language).	Understand	K2
ES-CS201.CO3	Understand the correct syntax of logical expression, branch instruction, iteration,	Understand	K2
ES-CS201.CO4	Apply array and pointer to solve problem.	Apply	K3
ES-CS201.CO5	Understand the use of , function, recursion.	Understand	K2
ES-CS201.CO6	Build analytical skill.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	3	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO4	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	3	3	3	2	1	1	1	1	1	2	2	2.33	2.33

Course Title:English	**Code: HM-HU201**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 2L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HM-HU201.CO1	Understand and apply English Speech Sounds for enhancing English Communication	Understand	K2
HM-HU201.CO2	Apply English Language Presentation Skill in Academic and in Professional Communication	Apply	K3
HM-HU201.CO3	Apply Receptive Skills of English in Academics and in Engineering Profession	Apply	K3
HM-HU201.CO4	Apply Writing Skill of English in Academics and in Profession	Apply	K3
HM-HU201.CO5	Apply Grammar Skill of English in Academic and in Professional Communication	Apply	K3
HM-HU201.CO6	Apply Critical Thinking Skill of English in Academic and in professionional Communication	Apply	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO2	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO3	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO4	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO5	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO6	2	2	2	2	2	2	-	2	-	3	-	2	1	1
AVG.	2	2	2	2	2	2	0	2	0	3	0	2	1	1

PRACTICAL

Course Title:Chemistry-I Laboratory	Code: BS-CH291
Type of Course: Practical	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 3P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

BS-CH291.CO1	Determine some physical parameter like viscosity of a solution and rate constant of a reaction	Determine	K5
BS-CH291.CO2	Determine the strength of an acid using conductometric method.	Determine	K5
BS-CH291.CO3	Determine the strength of an acid using pH metric method.	Determine	K5
BS-CH291.CO4	Determine partition coefficient of a compound	Determine	K5
BS-CH291.CO5	Estimate the amount of an ion present in a given solution using permanganometric and argentometric methods.	Estimate	K5
BS-CH291.CO6	Evaluate alkalinity (in terms of CaCO3 equvalent), hardness (in ppm) and amount of dissolved oxyzen (in mg/l) present in a given water sample using volumetric method.	Evaluate	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO2	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO3	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO4	1	2	2	3	-	-	-	-	-	-	-	-	-	-
CO5	1	2	2	3	-	-	-	-	-	-	-	-	-	-
CO6	1	2	2	3	-	-	-	-	-	-	-	-	-	-
AVG.	1	1.5	2	3	0	0	0	0	0	0	0	0	0	0

Course Title:Programming for ProblemSolving	Code: ES-CS291
Type of Course: Practical	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-CS291.CO1	Analyze the problem and formulate algorithms for them.	Analyze	K4
ES-CS291.CO2	Translate the algorithms to programs (in C language).	Understand	K2
ES-CS291.CO3	Understand the correct syntax of logical expression, branch instruction, iteration,	Understand	K2

ES-CS291.CO4	Apply array and pointer to solve problem.	Apply	K3
ES-CS291.CO5	Understand the use of , function, recursion.	Understand	K2
ES-CS291.CO6	Build analytical skill.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO2	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO3	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO4	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO5	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO6	2	2	2	2	-	-	-	-	-	-	-	2	2	1
AVG.	2	2	2	2	0	0	0	0	0	0	0	2	2	1

Course Title:Engineering Graphics & Design	Code: ES-ME291
Type of Course: Practical	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 1L+4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-ME291.CO1	Understand the applications of hand tools and machine tools.	Understand	K2
ES-ME291.CO2	Comprehend the safety measures required to be taken while using the tools.	Create	K6
ES-ME291.CO3	Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.	Evaluate	K5
ES-ME291.CO4	Fabricate components with their own hands.	Create	K6

ES-ME291.CO5	Confident on practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.	Understand	K2
ES-ME291.CO6	Produce small devices of their interest by assembling different components.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	1	-	1	-	-	-	-	-	-
CO3	1	-	-	-	-	1	-	1	1	-	-	-	-	-
CO4	1	-	-	-	-	-	2	-	2	1	1	-	-	1
CO5	1	-	-	-	-	-	2	-	2	1	1	1	-	-
CO6	1	-	-	-	-	-	2	-	2	1	2	1	-	1
AVG.	1	0	0	0	0	1	2	1	1.75	1	1.333	1	0	1.00

Course Title:Language Laboratory	Code: HM-HU291
Type of Course: Practical	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 2P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HM-HU291.CO1	Understand and apply English Speech Sounds for enhancing English Communication	Understand	K2
HM-HU291.CO2	Apply English Language Presentation Skill in Academic and in Professional Communication	Apply	K3
HM-HU291.CO3	Apply Receptive Skills of English in Academics and in Engineering Profession	Apply	K3
HM-HU291.CO4	Apply Writing Skill of English in Academics and in Profession	Apply	K3
HM-HU291.CO5	Apply Grammar Skill of English in Academic and in Professional Communication	Apply	K3

HM-HU291.CO6	**Apply Critical Thinking Skill of English in Academic and in professionional Communication**	**Apply**	**K3**

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO2	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO3	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO4	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO5	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO6	2	2	2	2	2	2	-	2	1	3	-	2	1	1
AVG.	2	2	2	2	2	2	0	2	1	3	0	2	1	1

SEMESTER – III THEORY

Course Title: Basic Electronics Engineering	**Code: ES-ECE 301**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-ECE301.CO1	Demonstrate the operating principle and output characteristics of PN junction diodes, Zener diode, rectifiers and different diode circuits, BJT.	Demonstrate	K2
ES-ECE301.CO2	Understand the principles of semiconductor devices and their applications	Understand	K2
ES-ECE301.CO3	Design an application using Operational amplifier.	Apply	K3
ES-ECE301.CO4	Understand the working of timing circuits and oscillators.	Understand	K2
ES-ECE301.CO5	Understand logic gates, flip flop as a building block of digital systems.	Understand	K2
ES-ECE301.CO6	Learn the basics of Electronic communication system	Understand	K2

Mapping of COs with POs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	3	3	1	1	1	1	1	2	1	1
CO2	1	3	3	3	1	1	1	1	1	1	1	1
CO3	1	2	3	3	1	1	1	1	1	1	1	1
CO4	1	3	3	3	1	1	1	1	1	1	1	1
CO5	1	3	3	3	1	1	1	1	1	1	1	1
CO6	1	3	3	3	2	2	1	1	1	1	2	2
Average	1	2.83	3	3	1.2	1.16	1	1	1	1.16	1.16	1.16

Course Title: Mathematics III	**Code: BS-M301**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 3L/week**

Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-M301.CO1	Apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines.	Apply	K3
BS-M301.CO2	Learn the tools of power series and Fourier series to analyze engineering problems and apply it to solve different problems by expressing functions in suitable series form.	Learn	K2
BS-M301.CO3	Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points of different surfaces of higher dimensions.	Apply	K3
BS-M301.CO4	Apply the knowledge of double and triple integral in different fields of Engineering to find area, volume and shape of different objects and also to get some physical properties like centre of gravity, moment of inertia, etc.	Apply	K3
BS-M301.CO5	Solve and model many core engineering problems with application of ODE of 1st order and higher order, Simultaneous Linear Differential Equation, Improper Integral and Laplace Transform.	Solve	K3
BS-M301.CO6	Identify and solve different type of graphs and Analyze/Model application of Graph Theory in Information Science.	Identify	K3

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO2	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO3	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO4	3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO5	3	2	2	-	-	-	-	-	-	-	-	-	2	1
CO6	3	3	2	1	-	-	-	-	-	-	-	-	2	1
AVG.	3	3	2	1	0	0	0	0	0	0	0	0	2	1

Course Title: Biology	Code: BS-BIO 301
Type of Course: Theory	Course Designation: Compulsory
Semester: 3rd	Contact Hours: 2L+1T/week

Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator:	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-BIO 301.CO1	Describe with examples the biological observations lead to major discoveries	Describe	K1
BS-BIO 301.CO2	Explain the classification of kingdom and building blocks of life, classification at cellular, energy and excretory level, habitat, study of model organisms, explain techniques of biophysics to study biological phenomena, cancer diagnosis and treatment.	Explain	K2
BS-BIO 301.CO3	Identify DNA as genetic material in the molecular basis of information transfer	Identify	K3
BS-BIO 301.CO4	Analyze biological processes at the reductionistic level.	Analyze	K4
BS-BIO 301.CO5	Apply thermodynamic principles to biological systems.	Apply	K3
BS-BIO 301.CO6	Identify microorganism	Identify	K3

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3							2				1
CO2			2				3					2
CO3		3		1		1						
CO4						2						2
CO5	3				2	2	2					1
CO6	3	1		2	2		2					
AVG.	2.8	2	2	1.5	2	1.6	2.3	2				1.5

Course Title: Engineering Mechanics	**Code: ES-ME301**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3^{rd}	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-ME301.CO1	To calculate Forces and Moments acting on the given statically determinant Structure & support reaction by using of concept of Free Body Diagram (FBD).	calculate	K2
ES-ME301.CO2	To explain Friction, limiting friction, static and dynamic friction, wedge friction	explain	K2
ES-ME301.CO3	To analysis of having structure like trusses, beams and frames	analysis	K4
ES-ME301.CO4	To determine centroid, centre of gravity, moment of inertia for both area and mass of the given lamina and solid- standard and composite.	determine	K4
ES-ME301.CO5	To illustrate the stability of an equilibrium and equilibrium of rigid body using the concept of virtual work and energy method.	illustrate	K4
ES-ME301.CO6	To calculate the velocity, acceleration, dynamics forces acting on practical and rigid bodies under rectilinear and curve linear motion.	calculate	K1

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	2	1	-	1	2	1	-	2	3	2
CO2	2	3	2	2	1	1	-	1	2	2	-	2	3	2
CO3	2	2	2	1	2	1	-	1	1	2	-	2	3	2
CO4	3	2	2	2	1	1	-	1	1	2	-	2	3	2
CO5	3	2	2	1	1	1	-	1	1	1	-	2	3	2
CO6	2	3	2	2	2	1	-	1	2	1	-	2	3	2
AVG.	2.5	2.5	2	1.5	1.5	1	0	1	1.5	1.5	0	2	3	2

Course Title: Thermodynamics	**Code: PC-ME301**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

PC-ME301.CO1	Explain the fundamental thermodynamic properties to solve the problems involving thermodynamic properties viz. Internal energy, enthalpy, entropy, temperature, pressure and specific volume etc	**Explain**	K1
PC-ME301.CO2	Interpret the phases of the pure substances from their thermodynamics properties.	**Interpret**	K2
PC-ME301.CO3	Evaluate changes in thermodynamic properties of pure substances.	**Evaluate**	K5
PC-ME301.CO4	Apply the first and second law of thermodynamics to the thermodynamic process, cycles and devices.	**Apply**	K3
PC-ME301.CO5	Analyse thermodynamic systems using entropy and exergy.	**Analyse**	K4
PC-ME301.CO6	Understand the basics of Vapour power cycles and Gas Power cycles.	**Understand**	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	1	2	1	2	1	-	2	3	2
CO2	3	2	2	2	1	1	2	1	2	1	-	2	3	2
CO3	3	2	2	2	1	1	2	1	2	1	-	2	3	2
CO4	3	2	2	2	1	1	2	1	2	1	-	2	3	2
CO5	3	2	3	2	1	1	2	1	2	1	-	2	3	2
CO6	3	2	2	2	1	1	2	1	2	1	-	2	3	2
AVG.	3	2	2	2	1	1	2	1	2	1	-	2	3	2

Course Title: Manufacturing Processes	**Code: PC-ME302**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

PC-ME302.CO1	Describe the fundamental principles and concepts of various manufacturing processes used in industry.	Describe	K1
PC-ME302.CO2	Apply the knowledge of metal casting principles to effectively address shrinkage, casting defects, and residual stresses in manufacturing	Apply	K3
PC-ME302.CO3	Explain the fundamentals of hot and cold working and Estimate loads and forces involved in bulk forming and sheet forming processes.	Explain	K2
PC-ME302.CO4	Apply the principles of orthogonal machining, chip formation and tool geometry in machining operations for improved tool performance and surface finish.	Apply	K3
PC-ME302.CO5	Examine the various force components involved in machining to address tool wear, and tool life	Examine	K2
PC-ME302.CO6	Discuss the physics behind welding, brazing, and soldering processes.	Discuss	K1

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	1	2	1	1	1	2	1	2	3	2
CO2	3	1	1	1	1	2	1	1	1	2	1	2	3	2
CO3	3	1	1	2	1	1	1	1	1	2	1	2	3	2
CO4	3	1	1	2	1	2	1	1	1	2	1	2	3	2
CO5	3	1	1	1	1	1	1	1	1	2	1	2	3	2
CO6	3	1	1	1	1	1	1	1	1	2	1	2	3	2
AVG.	**3**	**1**	**1**	**1.333333333**	**1**	**1.5**	**1**	**1**	**1**	**2**	**1**	**2**	**3**	**2**

SEMESTER – III PRACTICAL

Course Title: Practice of Manufacturing Process	**Code: PC ME391**
Type of Course: Laboratory	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC ME391.CO1	Practice pattern & mould making	Practice	P
PC ME391.CO2	Illustrate the fitting operation using hand tools	Illustrate	P
PC ME391.CO3	Perform basic forging processes	Perform	P

PC ME391.CO4	Perform sheet metal works	Perform	P
PC ME391.CO5	Practice GMAW, SMAW & Gas Welding	Practice	P
PC ME391.CO6	Demonstrate machining of typical products involving lathe, milling/shaping/machines	Demonstrate	P

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	2	2	1	1	1	1	1	1	1	2	3	3	2
CO2	1	2	2	1	1	1	1	1	1	1	2	3	3	2
CO3	1	2	2	1	1	1	1	1	1	1	2	3	3	2
CO4	1	2	2	1	3	1	1	1	2	1	2	3	3	2
CO5	1	2	3	2	1	2	1	1	2	1	3	3	3	2
CO6	1	2	2	1	1	1	1	1	1	1	2	3	3	2
AVG.	1.0	2.0	2.2	1.2	1.3	1.2	1.0	1.0	1.3	0.8	2.2	3.0	3.0	2.0

SEMESTER – IV THEORY

Course Title: Materials Engineering	**Code: ES-ME401**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**
ES-ME401.CO1	Analyze and classify crystal structures and imperfections in solids using unit cells and defect mechanisms.	Analyze	A
ES-ME401.CO2	Evaluate mechanical properties of materials through testing methods and understand their relationships, including stress-strain curves, hardness, and strength.	Evaluate	E
ES-ME401.CO3	Apply static failure theories and fracture mechanics to predict failure modes and analyze fatigue behaviour and non-destructive testing methods.	Apply	P
ES-ME401.CO4	Interpret phase diagrams and microstructures in alloys, including the iron- carbide phase diagram and micro structural aspects of the given steel types.	Interpret	U

ES-ME401.CO5	Apply heat treatment techniques to control microstructure development in steel and understand the effects on properties.	Apply	P
ES-ME401.CO6	Examine the properties and applications of alloyed steels, cast irons, copper alloys, aluminium alloys, nickel-based super alloys, and titanium alloys.	Examine	P

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	1	1	-	2	1	-	1	-	1	2	3	1
CO2	3	1	1	1	-	2	1	-	1	-	1	2	3	1
CO3	3	1	1	1	-	2	1	-	1	-	1	2	3	1
CO4	3	1	1	1	-	2	1	-	1	-	1	2	3	1
CO5	3	1	1	1	-	2	1	-	1	-	1	2	3	1
CO6	3	1	1	1	-	2	1	-	1	-	1	2	3	1
AVG.	3	1	1	1	-	2	1	-	1	-	1	2	3	1

Course Title: Applied Thermodynamics	**Code: PC-ME401**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**
PC-ME401.CO1	ANALYSE reacting systems using mass, energy and entropy balance and to determine chemical equilibrium composition.	ANALYSE	A
PC-ME401.CO2	ILLUSTRATE vapour power cycles, gas power cycles and vapour compression refrigeration cycles.	ILLUSTRATE	A
PC-ME401.CO3	USE psychrometric processes in real world air-conditioning system	USE	P
PC-ME401.CO4	EXPLORE the compressible fluid flow through nozzles, diffusers etc.	EXPLORE	P
PC-ME401.CO5	UNDERSTAND the operation of reciprocating compressors and to determine its performances.	UNDERSTAND	U
PC-ME401.CO6	ANALYSE steam turbines thermodynamically.	ANALYSE	A

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	1	1	1	1	1	1	1	-	1
CO2	2	3	2	1	1	1	1	1	1	1	-	1
CO3	2	3	2	1	1	1	1	1	1	1	-	1
CO4	2	3	2	1	1	1	1	1	1	1	-	1
CO5	2	3	2	1	1	1	1	1	1	1	-	1
CO6	2	3	2	1	1	1	1	1	1	1	-	1
AVG.	2	3	2	1	1	1	1	1	1	1	-	1

Course Title: Fluid Mechanics and Fluid Machines	**Code: PC-ME402**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**
PC-ME402.CO1	UNDERSTAND the fluid properties and conservation laws in fluid mechanics	Understand	U
PC-ME402.CO2	APPLY the conservation laws in fluid flow system	Apply	P
PC-ME402.CO3	EVALUATE pressure drop in pipe flow using Hagen-Poiseuli's equation for laminar flow in pipe	Evaluate	E
PC-ME402.CO4	DEMONSTRATE boundary layer concept	Apply	P
PC-ME402.CO5	ANALYSE the dimensional analysis in fluid machines and in fluid flow systems	Analyse	A
PC-ME402.CO6	Analyse the simple flow situation mathematically and EVALUATE the performance of hydraulic machines (Turbine and pump)	Evaluate	E

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	1	1	1	1	1	1	-	2
CO2	2	3	2	1	1	1	1	1	1	1	-	2
CO3	2	3	2	1	1	2	1	1	2	1	-	2

CO4	3	2	1	1	2	2	1	1	2	1	-	2
CO5	3	2	2	1	1	2	1	1	1	1	-	2
CO6	3	2	2	1	1	2	1	1	1	1	-	2
AVG .	2.7	2.3	1.8	1	1.2	1.7	1	1	1.3	1	-	2

Course Title: Strength of Materials	**Code: PC-ME403**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**
PC-ME403.CO1	EXPLAIN the concept of normal and shear stresses and strains and the relation amongst three elastic constants (E, K, G).	Explain	Understand/ U
PC-ME403.CO2	Discuss the bending theory to CALCULATE shear force and bending moment.	Calculate	Apply/ P
PC-ME403.CO3	DETERMINE the slope and deflection of cantilever, simply supported beams under the given loading conditions (UDL, point load, varying loads).	Determine	Apply/ P
PC-ME403.CO4	CALCULATE the critical load by using the buckling theory of columns.	Calculate	Apply/ P
PC-ME403.CO5	SOLVE the parameters (maximum shear stress, diameter, working stress, factor of safety) of the given problem related to torsion of circular shaft, helical springs.	Solve	Apply/ P
PC-ME403.CO6	CALCULATE the hoop and longitudinal stresses in thin/thick walled cylindrical/ spherical pressure vessels.	Calculate	Apply/ P

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3	2	2	2	1	1	1	1	1	-	1
CO2	2	3	2	2	2	1	1	1	1	1	-	1
CO3	2	3	2	2	2	1	1	1	1	1	-	1
CO4	2	3	2	2	2	1	1	1	1	1	-	1
CO5	2	3	2	2	2	1	1	1	1	1	-	1
CO6	2	3	2	2	2	1	1	1	1	1	-	1

AVG .	2	3	2	2	2	1	1	1	1	1	-	1

Course Title: Metrology & Instrumentation	**Code: PC-ME404**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-ME404.CO1	Understand the working of linear and angular measuring instruments and Determine the error and least count	Determine	P
PC-ME404.CO2	Calculate the limits, fits and tolerances of the Hole and Shaft system	Calculate	P
PC-ME404.CO3	Apply measurement techniques to determine the screw thread and surface roughness parameters	Apply	P
PC-ME404.CO4	Acquire an overview of performance characteristics of sensors and transducers for motion and dimension measurement	Acquire	U
PC-ME404.CO5	Demonstrate the working principle and applications of devices for measurement of force, torque, strain and stress	Demonstrate	P
PC-ME404.CO6	Interpret the use of vibration and temperature measuring instruments	Interpret	U

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	1	1	1	1	1	2	1	2	3	2
CO2	3	2	1	1	1	1	1	1	1	2	1	2	3	2
CO3	3	3	1	1	1	1	1	1	1	2	1	2	3	2
CO4	3	1	1	1	1	1	1	1	1	2	1	2	2	2
CO5	3	1	1	1	1	1	1	1	1	2	1	2	2	2
CO6	3	1	1	1	1	1	1	1	1	2	1	2	2	2
AVG .	**3.0**	**1.8**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**2.0**	**1.0**	**2.0**	**2.5**	**2.0**

SEMESTER – IV PRACTICAL

Course Title: Practice of Manufacturing Processes & system laboratory	Code: PC-ME491
Type of Course: Laboratory	Course Designation: Compulsory
Semester: 4th	Contact Hours: 4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC ME491.CO1	Measure the surface roughness & angles of different jobs	Measure	E
PC ME491.CO2	Develop simple digital logic circuit using 7400 series ICs.	Develop	P
PC ME491.CO3	Design and develop simple pneumatic circuits	Design	P
PC ME491.CO4	Acquire skill set to use precision length measuring instruments (Micro meter, Vernier, Height Gauge)	Acquire	P
PC ME491.CO5	Determine angles using sign bar & profile protector	Determine	P
PC ME491.CO6	Assess errors & correction factors of measuring devices (Micro meter, Vernier, Height Gauge)	Assess	E

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	3	2	1	-	-	-	-	2	-	-	2	2	3
CO2	-	3	2	2	-	-	-	-	2	-	-	2	2	3
CO3	-	3	2	2	-	-	-	-	2	-	-	2	2	3
CO4	-	3	2	1	-	-	-	-	2	-	-	2	2	3
CO5	-	3	2	1	-	-	-	-	2	-	-	2	2	3
CO6	-	3	2	1	-	-	-	-	2	-	-	2	2	3
AVG.	0.0	3.0	2.0	1.3	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	2.0	3.0

Course Title: Machine Drawing I	Code: PC-ME492
Type of Course: Laboratory	Course Designation: Compulsory
Semester: 4th	Contact Hours: 4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks

Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC ME492.CO1	UNDERSTAND the product symbol of standard components in mechanical, electrical & electronic engineering symbol, welding symbol and pipe joints	Understand	U
PC ME492.CO2	DRAW orthographic projection, sectional and auxiliary sections of given machine components.	Draw	A
PC ME492.CO3	DRAW assembly and detailed drawing of different mechanical components and tools such as plummer block, flange coupling etc.	Draw	A
PC ME492.CO4	UNDERSTAND the commands and GUI of AutoCAD software	Understand	U
PC ME492.CO5	DRAW orthographic and isometric projections of given mechanical components by using AutoCAD or similar software	Draw	A

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	3	1	1	1	1	1	1	2		2	3	1
CO2	2	2	3	1	1	2	1	1	1	2		2	3	1
CO3	2	2	3	1	1	2	1	1	1	2		2	3	1
CO4	2	2	3	1	3	2	1	1	1	2		2	3	1
CO5	2	2	3	1	3	2	1	1	1	2		2	3	1
AVG.	2.0	1.8	3.0	1.0	3.0	1.8	1.0	1.0	1.0	2.0		2.0	3.0	1.0

.

SEMESTER – IV SESSIONAL

Course Title: Environmental Science	Code: MC-481 (ME)
Type of Course: Sessional	Course Designation: Compulsory
Semester: 4th	Contact Hours: NA
Continuous Assessment:	Final Exam:
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

MC-481 (ME).CO1	Understand the natural environment and its relationships with human activities.	Understand	L2
MC-481 (ME).CO2	Apply the fundamental knowledge of science and engineering to assess environmental and health risk.	Apply	L3
MC-481 (ME).CO3	Develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations.	Create	L6
MC-481 (ME).CO4	Acquire skills for scientific problem-solving related to air, water, noise & land pollution.	Analyse	L4
MC-481 (ME).CO5	Apply the laws and protection act of India for Environmental Management and Environmental Audit.	Analyse	L4
MC-481 (ME).CO6	Analyze the population growth in different perspectives of environmental scenarios.	Analyse	L4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1					2	2	2		1		3
CO2	1					2	2	2		1		3
CO3	1					2	2	2		1		3
CO4	1					2	2	2		1		3
CO5	1					2	2	2		1		3
CO6	1					2	2	2		1		3
AVG.	**1**					**2**	**2**	**2**		**1**		**3**

SEMESTER – V THEORY

Course Title: Heat Transfer	**Code: PC-ME501**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**
PC-ME501.CO1	CLASSIFY the modes of heat transfer.	Understand	U
PC-ME501.CO2	ANALYSE steady and unsteady conduction phenomena.	Analyse	A

PC-ME501.CO3	SOLVE convections problems of laminar and turbulent flow situations.	Apply	P
PC-ME501.CO4	CALCULATE radiation heat transfer between surfaces, using radiative properties, view factors etc.	Apply	P
PC-ME501.CO5	ILLUSTRATE and design of heat exchangers.	Analyse	A
PC-ME501.CO6	UNDERSTAND similarities between heat and mass transfer.	Understand	U

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3	1	1	1	1	1	1	1	1	-	1
CO2	2	3	1	1	1	1	1	1	1	1	-	1
CO3	2	3	1	1	1	1	1	1	1	1	-	1
CO4	2	3	1	1	1	1	1	1	1	1	-	1
CO5	2	3	1	1	1	1	1	1	1	1	-	1
CO6	2	3	1	1	1	1	1	1	1	1	-	1
AVG.	2	3	1	1	1	1	1	1	1	1	-	1

Course Title: Solid Mechanics	**Code: PC-ME502**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**
PC-ME502.CO1	Understand the basic tensors, notations of the theory of elasticity including strain/displacement and Hooke's law relationship to solve the practical problems related to the theory of elasticity.	Understand	U
PC-ME502.CO2	Discuss derivation of Cauchy's relations, principal stresses and directions.	Discuss	R
PC-ME502.CO3	Determine plane stress & plane strain of the given axisymmetric problems by using governing equations in cartesian, cylindrical and spherical coordinates.	Determine	P
PC-ME502.CO4	To Solve problem by using concept of solid mechanics in thick cylinders, rotating discs, torsion of noncircular cross-sections & stress concentration including thermo-elasticity & 2D contact stresses.	Solve	P

PC-ME502.CO5	Examine the influence the influence of geometric and loading parameters in plain stress and plain strain problems.	Examine	A
PC-ME502.CO6	To Solve given structural problems by applying the concepts of potentials and energy methods and plasticity.	Solve	P

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3	2	1	1	1	1	1	1	-	-	1	3	2
CO2	1	3	2	1	1	1	1	1	1	-	-	1	3	2
CO3	1	3	2	1	1	1	1	1	1	-	-	1	3	2
CO4	1	3	2	1	1	1	1	1	1	-	-	1	3	2
CO5	1	3	2	1	1	1	1	1	1	-	-	1	3	2
CO6	1	3	2	1	1	1	1	1	1	-	-	1	3	2
AVG.	**1**	**3**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**-**	**-**	**1**	**3**	**2**

Course Title: Kinematics and Theory of Machines	**Code: PC-ME503**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-ME503.CO1	ANALYZE the motion of simple mechanisms in terms of the displacement, velocity and acceleration at any point on a rigid link. Also, determine the degree of freedom of simple mechanisms and their inversions.	Analyze	A
PC-ME503.CO2	SYNTHESIZE higher pair mechanisms (cam & gear systems) to generate specified output motion.	Synthesize	A
PC-ME503.CO3	Understand the relative motion of friction surfaces in contact and APPLY the knowledge during the design of the machine parts which work on the principle of rolling and sliding friction.	Apply	P
PC-ME503.CO4	Understand basic concepts of vibration and DETERMINE vibration parameters related to problems of SDOF vibratory systems (Free, Forced with or without damping).	Determine	P
PC-ME503.CO5	EXPLORE rotary and reciprocating unbalanced systems.	Explore	P

PC-ME503.CO6	Understand the working principle of governors, flywheel & gyroscope and DETERMINE their operational parameters.	Determine	P

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3	1	2	1	1	1	1	2	2	-	2	3	2
CO2	1	3	1	2	1	2	1	1	2	2	-	2	3	2
CO3	3	3	1	2	1	1	1	1	1	1	-	1	3	1
CO4	3	3	2	2	2	2	1	1	1	1	-	2	3	1
CO5	1	3	3	2	1	2	2	1	1	1	-	2	3	1
CO6	1	2	1	3	1	2	1	1	1	1	-	2	3	1
AVG.	1.67	2.83	1.50	2.16	1.16	1.67	1.16	1.00	1.33	1.33	-	1.83	3.00	1.33

Course Title: Effective Technical Communication	**Code: HM-HU501**
Type of Course: Theory	**Course Designation: Elective**
Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HM-HU501.CO1	Understand the dynamics of Verbal and non-verbal aspects of technical communication	Understand	L2
HM-HU501.CO2	Practice multi-step writing process to plan, draft, and revise reports, correspondence, and presentations.	Remember	L1
HM-HU501.CO3	Illustrate and examine the knowledge of ethical aspects of engineering	Apply	L3
HM-HU501.CO4	Demonstrate and explain social and professional etiquettes	Analyse	L4
HM-HU501.CO5	Plan self-development and practice self- assessment to function on multi-disciplinary teams.	Evaluate	L5
HM-HU501.CO6	Organize and write business correspondence properly and correctly, using appropriate formats, grammar, vocabulary, and syntax, and demonstrate effective writing and editing skills.	Create	L6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	1	1	1	1	1	3	1	3
CO2	3	2	2	1	1	1	1	1	3	3	2	3
CO3	1	2	2	1	1	1	1	3	3	3	1	2
CO4	3	3	3	3	1	2	1	2	3	3	3	3
CO5	2	3	3	2	2	2	2	2	3	3	3	3
CO6	3	3	3	2	1	1	1	1	2	3	2	3
AVG.	2.5	2.3	2.3	1.7	1.2	1.3	1.2	1.7	2.5	3	2	2.8

Course Title:Essence of Indian Knowledge Tradition	**Code: MC-ME501**
Type of Course: Theory	**Course Designation:Compulsory**
Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
MC-ME501.CO1	To facilitate students with the concepts of Indian traditional knowledge	Understand	K1
MC-ME501.CO2	To make them understand the importance of the root of knowledge system	Understand	K1
MC-ME501.CO3	Understand the concept of Traditional knowledge and its importance	Understand	K1
MC-ME501.CO4	Know the need and importance of protecting traditional knowledge	Understand	K1
MC-ME501.CO5	Know the various enactments related to the protection of traditional knowledge	Understand	K1
MC-ME501.CO6	Understand the concepts of Intellectual property to protect the traditional knowledge	Understand	K1

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1	2	1	1	1	1	2	2	-	2
CO2	1	3	1	2	1	2	1	1	2	2	-	2

CO3	3	3	1	2	1	1	1	1	1	1	-	1
CO4	3	3	2	2	2	2	1	1	1	1	-	2
CO5	1	3	3	2	1	2	2	1	1	1	-	2
CO6	1	2	1	3	1	2	1	1	1	1	-	2
AVG.	1.67	2.83	1.50	2.16	1.16	1.67	1.16	1.00	1.33	1.33	-	1.83

SEMESTER – V PRACTICAL

Course Title: Mechanical Engineering Laboratory (Thermal) I	**Code: PC-ME591**
Type of Course: Laboratory	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-ME591.CO1	DEMONSTRATE the operation of fluid flow measuring devices.	Apply	P
PC-ME591.CO2	CONDUCT experiments on water turbines and pumps.	Apply	P
PC-ME591.CO3	DETERMINE the calorific value of fuels and their flash and fire points.	Apply	P
PC-ME591.CO4	DETERMINE the performance parameters of four- stroke Diesel engines.	Apply	P
PC-ME591.CO5	EXAMINE the thermal conductivity, emissivity and the convective heat transfer coefficient of solid and fluid materials.	Apply	P

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	1	1	1	1	1	1	1	-	1
CO2	2	3	2	1	1	1	1	1	1	1	-	1
CO3	2	3	2	1	1	1	1	1	1	1	-	1
CO4	2	3	2	1	1	1	1	1	1	1	-	1
CO5	2	3	2	1	1	1	1	1	1	1	-	1
CO6												

AVG.	2	3	2	1	1	1	1	1	1	1	-	1

Course Title: Machine Drawing-II	Code: PC-ME592
Type of Course: Laboratory	Course Designation: Compulsory
Semester: 5th	Contact Hours: 4P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-ME592.CO1	To acquire an ability to apply knowledge of Modeling, science & engineering	Apply	P
PC-ME592.CO2	To model this drawing even in CAD/CAM software by applying the basic knowledge of machine drawing	Apply	P
PC-ME592.CO3	To demonstrate an ability to design and conduct experiments, analyze and interpret data and assembly and disassembly drawings knowledge will be provided.	Apply	P
PC-ME592.CO4	To understand and apply the knowledge of machine drawing as a system of Communication in which ideas are expressed clearly and all information fully conveyed	Apply	P
PC-ME592.CO5	To understand the design a system, component or process to meet desired needs within, realistic constraints such as manufacturability, economic, environmental, safety & sustainability etc., to represent a part drawing and assembly drawings	Apply	P
PC-ME592.CO6	To identify, formulates, analyzes and solve Engineering Problems in Optimum time	Apply	P

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	1	1	1	1	1	1	1	-	1
CO2	2	3	2	1	1	1	1	1	1	1	-	1
CO3	2	3	2	1	1	1	1	1	1	1	-	1
CO4	2	3	2	1	1	1	1	1	1	1	-	1
CO5	2	3	2	1	1	1	1	1	1	1	-	1
CO6												
AVG.	2	3	2	1	1	1	1	1	1	1	-	1

SEMESTER – V SESSIONAL

Course Title: Project-I (Summer internship)	**Code: PW-ME581**
Type of Course: Sessional	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: NA**
Continuous Assessment:	**Final Exam:**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**
PW-ME581.CO1	Develop the skills, knowledge and points of view needed by engineering professionals	Develop	P
PW-ME581.CO2	Develop critical thinking and problem-solving skills by analyzing underlying issue/s to challenges	Develop	P
PW-ME581.CO3	Communicate with different professionals in the work environment through written and oral means	Communicate	U
PW-ME581.CO4	Exhibit professional ethics by displaying positive disposition during internship	Exhibit	P

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2	2	2	1	2	1	2	2	3	1
CO2	2	2	1	2	1	1	2	1	2	2	3	1
CO3	1	1	1	1	1	1	1	1	2	3	3	2
CO4	1	1	1	1	1	1	1	2	2	2	3	2
AVG.	1.5	1.5	1.25	1.5	1.25	1	1.5	1.25	2	2.25	3	1.5

SEMESTER – VI THEORY

Course Title: Manufacturing Technology	**Code: PC-ME601**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-ME601.CO1	Illustrate principles of tooling design and selection for conventional and non-conventional machining processes.	Illustrate	U
PC-ME601.CO2	Use the principle of measurement for tool wear, part quality, and inspection in manufacturing processes.	Use	P
PC-ME601.CO3	Describe assembly practices, process planning, and material handling in manufacturing and assembly operations.	Describe	U
PC-ME601.CO4	Discuss the understanding of NC/CNC machine tools and systems, including their components, functions, and automation capabilities.	Discuss	U
PC-ME601.CO5	Write the part programming for CNC lathe and milling machines	Write	P
PC-ME601.CO6	Demonstrate rapid prototyping methods and their applications in manufacturing	Demonstrate	U

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	1	2	1	1	1	2	1	2	3	2
CO2	3	1	1	1	1	1	1	1	1	2	1	2	3	2
CO3	3	1	1	1	1	1	1	1	1	2	1	2	3	2
CO4	3	1	1	1	1	1	1	1	1	2	1	2	3	2
CO5	2	2	1	1	3	1	1	1	1	2	1	2	3	2
CO6	3	1	1	1	1	1	1	1	1	2	1	2	3	2
AVG.	**2.83**	**1.33**	**1.00**	**1.00**	**1.33**	**1.17**	**1.00**	**1.00**	**1.00**	**2.00**	**1.00**	**2.00**	**3.00**	**2.00**

Course Title: Design of Machine Elements	**Code: PC-ME602**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

PC-ME602.CO1	Understand the failure criteria, concept of mechanics of materials, empirical design formula & safety considerations, codes & standards for design.	Understand	U
PC-ME602.CO2	Analyze permanent and temporary joints viz. riveted joints, welded joints and bolted joints based on design aspect.	Analyze	A
PC-ME602.CO3	Analyze design of shafts, belts, gears, chains and pulleys.	Analyze	A
PC-ME602.CO4	Solve design problems on spring, cotter joint, knuckle joint based on optimum criteria.	Solve	P
PC-ME602.CO5	Determine optimum design of Coupling, brakes and screw jack based on friction principle.	Determine	P
PC-ME602.CO6	Apply knowledge of design principles and calculations to design springs, clutches and bearings.	Apply	P

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO	PSO2
CO1	2	1	2	2	1	3	1	1	1	1	-	2	3	1
CO2	2	2	2	2	1	3	2	1	1	1	-	2	3	1
CO3	2	2	2	2	1	3	2	1	1	1	-	2	3	1
CO4	2	2	2	2	1	3	2	1	1	1	-	2	3	1
CO5	2	2	2	2	1	3	2	1	1	1	-	2	3	1
CO6	2	2	2	2	1	3	2	1	1	1	-	2	3	1
AVG .	**2**	**1.8**	**2**	**2**	**1**	**3**	**1.8**	**1**	**1**	**1**	**-**	**2**	**3**	**1**

Course Title: Internal Combustion Engines & Gas Turbines	**Code: PE-ME601A**
Type of Course: Theory	**Course Designation: Elective**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PE-ME601A.CO1	UNDERSTAND the basic concepts, components and operations of IC Engines.	Understand	U
PE-ME601A.CO2	ILLUSTRATE the process of carburation and ignition of SI Engines and injections of CI Engines.	Illustrate	P
PE-ME601A.CO3	DESCRIBE the conventional and alternative fuels and combustion phenomena in SI and CI engines.	Describe	U

PE-ME601A.CO4	EVALUATE the performance parameters of IC engines.	Evaluate	E
PE-ME601A.CO5	CLASSIFY the essential components of gas turbines along with its performance improving methods (intercooling, reheating and regenerating).	Classify	A
PE-ME601A.CO6	ILLUSTRATE the working principles of various types jet propulsive rockets.	Illustrate	P

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	1	1	1	1	1	1	1	-	1
CO2	2	3	2	1	1	1	1	1	1	1	-	1
CO3	2	3	2	1	1	1	1	1	1	1	-	1
CO4	2	3	2	1	1	1	1	1	1	1	-	1
CO5	2	3	2	1	1	1	1	1	1	1	-	1
CO6	2	3	2	1	1	1	1	1	1	1	-	1
AVG.	2	3	2	1	1	1	1	1	1	1	-	1

Course Title: Refrigeration & Air Conditioning	**Code: PE-ME602B**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-ME501.CO1	To know about the basics of refrigeration and air-conditioning system	Understand	K1
PC-ME501.CO2	To learn about different types of Refrigeration, Air-Conditioning and ventilation systems	Understand	K1
PC-ME501.CO3	To know about designing a Refrigeration and Air-Conditioning system	Understand	K1
PC-ME501.CO4	To know about the equipment of Refrigeration, Air-Conditioning and Ventilation	Understand	K1
PC-ME501.CO5	To learn about different components of these systems	Understand	K1

PC-ME501.CO6	To know definitions and principles related to Psychometry	Understand	K1

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1	2	1	1	1	1	2	2	-	2
CO2	1	3	1	2	1	3	1	1	2	2	-	2
CO3	3	3	1	2	1	1	1	1	1	1	-	1
CO4	3	3	2	2	2	2	1	1	1	1	-	2
CO5	1	3	3	2	1	2	2	1	1	1	-	2
CO6	1	3	3	2	1	2	2	1	1	1	-	2
AVG.	1.67	3	1.83	2	1.16	1.83	1.33	1	1.33	1.33	-	1.83

Course Title: Operations Research	**Code: HM-HU601**
Type of Course: Theory	**Course Designation: Elective**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HM-HU601.CO1	To study the various Operations Research tools	Understand	K2
HM-HU601.CO2	To study to apply an appropriate model to the given situation	Apply	K3
HM-HU601.CO3	Apply forecasting methods for predicting demands	Apply	K3
HM-HU601.CO4	Make decisions under certainty, uncertainty and conflicting situations	Analyze	K4
HM-HU601.CO5	Apply linear programming tools for optimal utilization of resources in various types of industries	Apply	K3
HM-HU601.CO6	Solve transportation problems to minimize cost and understand the principles of assignment	Solving	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO	PSO2
CO1	1	1	1	3	1	1	1	1	2	1		1	3	2

CO2	1	1	1	3	1	2	1	1	2	1		1	3	2
CO3	1	1	1	3	1	2	1	1	2	1		1	3	2
CO4	1	1	1	3	1	2	1	1	2	1		1	3	2
CO5	1	1	1	3	1	2	1	1	2	1		1	3	2
CO6	1	1	1	3	1	2	1	1	2	1		1	3	2
AVG .	1	1	1	3	1	1.8	1	1	2	1		1	3	2

Course Title: Constitution of India	**Code: MC-ME601**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
MC-ME601.CO1	Understand Basic Structure of the Constitution of India	Understand	K2
MC-ME601.CO2	Apply the understanding in Engineering Profession	Apply	K3
MC-ME601.CO3	Apply Constitutional Values in Engineering Education	Apply	K3
MC-ME601.CO4	Apply Constitutional Provisions in Policy matters of CSE	Apply	K3
MC-ME601.CO5	Apply Team Spirit and Constitutional Legislative Provisions for Industrial Design	Apply	K3
MC-ME601.CO6	Analyze Constitutional Values of Legislation, Executive & Judiciary in the light of the Professional requirements of Computer Science Engineering	Analyze	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO	PSO2
CO1	-	-	-	-	-	2	-	2	3	1	-	2	1	1
CO2	-	-	-	-	-	2	-	2	3	1	-	2	1	1
CO3	-	-	-	-	-	2	-	2	3	1	-	2	1	1
CO4	-	-	-	-	-	2	-	2	3	1	-	2	1	1

CO5	-	-	-	-	-	2	-	2	3	1	-	2	1	1
CO6	-	-	-	-	-	2	-	2	3	1	-	2	1	1
AVG.	0	0	0	0	0	2	0	2	3	1	0	2	1	1

SEMESTER – VI PRACTICAL

Course Title: Mechanical Engineering Laboratory II (Design)	**Code: PC-ME691**
Type of Course: Laboratory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-ME691.CO1	DEMONSTRATE kinematic characteristics of mechanisms (Cam-Follower, 4 BAR linkages)	Demonstrate	U
PC-ME691.CO2	ANALYZE rotating balancing problem and vibration characteristics of different undamped and damped system (free, forced)	Analyze	A
PC-ME691.CO3	CONDUCT the experiment of hardness and toughness of given materials and apply them practically	Conduct	A
PC-ME691.CO4	DETERMINE elastic parameters of given materials in tension/compression and in shear test	Determine	A
PC-ME691.CO5	PREPARE standard metallographic heat-treated samples for the given engineering materials to examine microstructure.	Prepare	A
PC-ME691.CO6	MEASURE strain of the given materials by using strain gauge rosettes.	Measure	U

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	2	1	3	1	1		1	2	1		2	3	2
CO2	1	2	1	3	1	1		1	2	1		2	3	2
CO3	2	2	1	3	1	1		1	2	1		2	3	2
CO4	2	2	1	3	1	1		1	2	1		2	3	2
CO5	1	2	3	3	1	1		1	2	1		2	3	2

CO6	1	2	2	3	1	1		1	2	1		2	3	2
AVG.	1.67	2	1.5	3	1.0	1.0		1.0	2.0	1.0		2.0	3.0	2.0

SEMESTER – VI SESSIONAL

Course Title: Project-II (Summer internship)	**Code: PW-ME681**
Type of Course: Sessional	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: NA**
Continuous Assessment:	**Final Exam:**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PW-ME681.CO1	Develop the skills, knowledge and points of view needed by engineering professionals	Develop	P
PW-ME681.CO2	Develop critical thinking and problem-solving skills by analyzing underlying issue/s to challenges	Develop	P
PW-ME681.CO3	Communicate with different professionals in the work environment through written and oral means	Communicate	U
PW-ME681.CO4	Exhibit professional ethics by displaying positive disposition during internship	Exhibit	P

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	2	1	2	1	2	1	3	3
CO2	2	2	1	2	1	1	2	2	1	1	2	3
CO3	1	1	1	1	1	1	1	2	1	1	2	3
CO4	1	1	1	1	1	1	1	3	1	1	2	3

SEMESTER – VII THEORY

Course Title: Advanced Manufacturing Technology	**Code: PC-ME701**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 7th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**

Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-ME701.CO1	Identify different nontraditional machining processes and their applications.	Identify	U
PC-ME701.CO2	Describe the basic working principles and mechanism of metal removal in ultrasonic machining and Abrasive jet machining and assess its effectiveness in various applications	Describe	A
PC-ME701.CO3	Apply the knowledge of process parameters, tool selection, and working medium to achieve desired MRR and accuracy in ECM & EDM	Apply	P
PC-ME701.CO4	Illustrate the characteristics and applications of laser beam machining, electron beam machining, ion beam machining, and plasma arc machining.	Illustrate	U
PC-ME701.CO5	Discuss the working principles, process variables, and performance of advanced finishing processes such as abrasive flow machining (AFM), magnetic abrasive finishing (MAF), and chemo-mechanical polishing.	Discuss	U
PC-ME701.CO6	Describe the principles of micromachining, including chip formation and size effect, and identify the challenges associated with micro-machining and its applications	Describe	U

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	1	2	1	1	1	2	1	2	3	2
CO2	3	1	1	1	1	2	1	1	1	2	1	2	3	2
CO3	3	1	1	2	1	1	1	1	1	2	1	2	3	2
CO4	3	1	1	2	1	2	1	1	1	2	1	2	3	2
CO5	3	1	1	1	1	1	1	1	1	2	1	2	3	2
CO6	3	1	1	1	1	1	1	1	1	2	1	2	3	2
AVG.	**3.0**	**1.0**	**1.0**	**1.3**	**1.0**	**1.5**	**1.0**	**1.0**	**1.0**	**2.0**	**1.0**	**2.0**	**3.0**	**2.0**

Course Title: Advanced Welding Technology	**Code: PE-ME701H**
Type of Course: Theory	**Course Designation: Elective**
Semester: 7th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**

Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PE-ME701H.CO1	Understand the principles and characteristics of various welding processes and their parametric influences.	Understan d	U
PE-ME701H.CO2	Discuss appropriate welding techniques and joint design for different types of materials and welding processes.	Discuss	R
PE-ME701H.CO3	Apply the knowledge of power sources, polarity, and electrode characteristics for the selection of suitable arc welding technique.	Apply	P
PE-ME701H.CO4	Explain critical and precision welding processes, such as USW, PAW, LBW, and EBW, in terms of their advantages and limitations.	Explain	U
PE-ME701H.CO5	Assess the weldability of different materials, including plain carbon steel, stainless steel, cast iron, and aluminium alloys, based on their metallurgical properties and behaviour during welding.	Assess	P
PE-ME701H.CO6	Identify common welding defects, understand their causes and remedies, and Select appropriate inspection and testing methods for welded joints.	Identify	A

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	1	1	1	1	1	1	1	2	2	2
CO2	2	2	3	2	1	2	2	1	1	1	1	2	2	2
CO3	2	2	2	3	2	2	1	1	2	1	1	2	2	3
CO4	2	2	3	3	1	2	1	1	1	1	1	2	2	1
CO5	2	2	3	3	1	2	1	1	1	1	1	2	2	3
CO6	2	2	3	2	1	2	1	1	1	1	1	2	2	3
AVG .	2.0	2.0	2.8	2.5	1.2	1.8	1.2	1.0	1.2	1.0	1.0	2.0	2.0	2.3

Course Title: Automobile Engineering	Code: PE-ME701A
Type of Course: Theory	Course Designation: Compulsory
Semester: 7th	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	Approved by HoD (convenor of DAB)

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PE-ME701A.CO1	Understand the basic lay-out of an automobile and engines for two-wheelers, three wheelers, four wheelers, & other passenger and commercial vehicles.	Describe	U
PE-ME701A.CO2	Explain the operation of engine cooling, lubrication, ignition, electrical, electronics and air conditioning systems.	Explain	U
PE-ME701A.CO3	Illustrate the principles of transmission, suspension, steering and braking systems and construction of wheels and tyres.	Illustrate	A
PE-ME701A.CO4	Determine the tractive effort and power requirements & learn the use of torque-speed curve.	Determine	P
PE-ME701A.CO5	Learn automobile restraint system.	Illustrate	P
PE-ME701A.CO6	Know the latest developments in automobiles.	Tell	R

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3	2	1	2	2	2	1	2	1	1	2
CO2	2	3	2	1	2	2	2	2	2	1	1	2
CO3	2	3	2	1	2	1	1	1	2	1	1	2
CO4	2	3	2	1	2	1	1	1	2	1	1	2
CO5	2	3	2	1	2	2	1	2	2	1	1	2
CO6	2	3	2	1	2	2	1	2	2	1	1	2
AVG.	**2**	**3**	**2**	**1**	**2**	**1.66**	**1.33**	**1.5**	**2**	**1**	**1**	**2**

Course Title: Economics for Engineers	**Code: HM-HU701**
Type of Course: Theory	**Course Designation: Elective**
Semester: 7^{th}	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HM-HU701.CO1	EXPLAIN principles of decision making in fixed and variable cost, life cycle cost, estimating models, improvement and learning curve.	Explain	U
HM-HU701.CO2	ANALYZE economic conditions viz. inflation, deflation, economic criterion and present worth.	Analyze	A

HM-HU701.CO3	ANALYZE cash flow, rate of return, cost ratio, and break-even analysis.	Analyze	A
HM-HU701.CO4	UNDERSTAND depreciation, types of property, tax regulation and capital allowance.	Understand	A
HM-HU701.CO5	DESCRIBE inflation, price change, types of index and use of price index.	Describe	U
HM-HU701.CO6	UNDERSTAND accounting, balance sheet, income statement, cost accounting, direct and Indirect cost.	Understand	U

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	2	2	2		2	2	1	1	1	3	2	1	3
CO2	1	2	2	2		2	2	1	1	1	3	2	1	3
CO3	1	2	2	2		2	2	1	1	1	3	2	1	3
CO4	1	2	2	2		2	2	1	1	1	3	2	1	3
CO5	1	2	2	2		2	2	1	1	1	3	2	1	3
CO6	1	2	2	2		2	2	1	1	1	3	2	1	3
AVG.	1.0	2.0	2.0	2.0		2.0	2.0	1.0	1.0	1.0	3.0	2.0	1.0	3.0

Type of Course: Theory	**Course Designation: Elective**
Semester: 7th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**
OE-ME701A.CO1	Understand the concepts of Industrial Engineering	Understand	K2
OE-ME701A.CO2	Explain production systems and their characteristics	Explain	K2
OE-ME701A.CO3	Understand the role of productivity in streamlining a production system	Understand	K2
OE-ME701A.CO4	Describe different aspects of work system design and facilities design pertinent to manufacturing industries	Describe	K2
OE-ME701A.CO5	Apply forecasting and scheduling techniques to production systems	Apply	K3

OE-ME701A.CO6	Apply the inventory management tools in managing inventory	Apply	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	3	1	1	1	1	1	-	1	1	3
CO2	2	2	2	2	3	1	1	1	1	1	-	1	1	3
CO3	2	2	2	2	3	1	1	1	1	1	-	1	1	3
CO4	2	2	2	2	3	1	1	1	1	1	-	1	1	3
CO5	2	1	2	2	3	1	1	1	1	1	-	1	1	3
CO6	2	1	2	2	3	1	1	1	1	1	-	1	1	3
AVG.	2	1.6	2	2	3	1	1	1	1	1	-	1	1	3

SEMESTER – VII PRACTICAL

Course Title: Mechanical Engineering Laboratory III (Manufacturing)	**Code: PC-ME791**
Type of Course: Laboratory	**Course Designation: Compulsory**
Semester: 7th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PC-ME791.CO1	Perform Part Programming on CNC Lathe for Multi Stepped Shaft & Single Stepped Shaft with Round End.	Perform	P
PC-ME791.CO2	Apply Part Programming on CNC Milling for Single Slot, Curve Slot and Square Loop.	Apply	P
PC-ME791.CO3	Demonstrate various axes movement of vertically articulated robot arm.	Demonstrate	U
PC-ME791.CO4	Determine cutting forces in turning by using Dynamometer	Determine	P
PC-ME791.CO5	Conduct experiment in MMA welding and Examine dye penetration test for determination of welding joint defect.	Conduct	P
PC-ME791.CO6	Determine fineness number, AFS clay content and permeability number of moulding sand.	Determine	P

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

CO1	2	2	2	2	3	1	2	1	1	1	1	2	3	2
CO2	2	2	2	2	3	1	2	1	1	1	1	2	3	2
CO3	2	2	2	2	3	1	2	1	1	1	1	2	3	1
CO4	2	2	3	2	1	1	1	1	1	1	1	2	2	1
CO5	2	2	3	2	1	1	2	1	1	1	1	2	2	1
CO6	2	2	3	2	1	1	1	1	1	1	1	2	2	1
AVG.	2.0	2.0	2.5	2.0	2.0	1.0	1.7	1.0	1.0	1.0	1.0	2.0	2.5	1.3

SEMESTER – VII SESSIONAL

Course Title: Project III	**Code: PW-ME781**
Type of Course: Sessional	**Course Designation: Compulsory**
Semester: 7th	**Contact Hours: NA**
Continuous Assessment:	**Final Exam:**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
MC-481 (ME).CO1	Selecting topic of the project & Generating its objectives	Create	C
MC-481 (ME).CO2	Practice finding relevant course material on the Internet and non-electronic sources	Create	C
MC-481 (ME).CO3	Preparing work plan and Preliminary report	Create	C
MC-481 (ME).CO4	Preparing presentation and explaining it to the audience	Create	C
MC-481 (ME).CO5	Selecting topic of the project & Generating its objectives	Create	C

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3
AVG.	3	3	3	3	3	3	3	3	3	3	3	3

SEMESTER – VIII THEORY

Course Title: Power Plant Engineering	**Code: PE-ME801B**
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PE-ME801B.CO1	Analyze the vapour power cycles and their modifications.	Analyze	A
PE-ME801B.CO2	Understand boilers & calculate its performance parameters.	Understand	U
PE-ME801B.CO3	Analyze the combustion phenomenon of fuels.	Analyze	A
PE-ME801B.CO4	Determine the performance parameters of steam nozzles and steam turbines.	Determine	P
PE-ME801B.CO5	Illustrate and Design the condensers and cooling towers.	Design	C
PE-ME801B.CO6	Determine power plant economic parameters and know about the Diesel and gas plants, pollution and its control.	Determine	P

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	1	1	1	1	1	2	1	1	2	2	3
CO2	2	3	2	1	2	2	2	2	2	1	2	2	2	3
CO3	2	3	2	1	1	1	1	1	2	1	1	2	2	3
CO4	2	3	2	1	2	1	1	1	2	1	2	2	2	3
CO5	2	3	3	1	2	2	2	2	2	1	2	2	2	3
CO6	2	3	2	1	1	2	2	2	2	1	2	2	2	3
AVG.	**2**	**3**	**2.167**	**1**	**1.5**	**1.5**	**1.5**	**1.5**	**2**	**1**	**1.67**	**2**	**2**	**3**

Course Title: Maintenance Engineering	**Code: PE-ME802I**
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**

Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PE-ME802I.CO1	UNDERSTAND maintenance systems through condition monitoring; Maintainability, failure pattern, availability of equipment / systems and design for maintainability.	Understand	U
PE-ME802I.CO2	ANALYZE the Total Productive Maintenance (TPM).	Analyze	A
PE-ME802I.CO3	UNDERSTAND the Organizational structures for maintenance.	Understand	U
PE-ME802I.CO4	ANALYZE the Economic Aspect of Maintenance.	Analyze	
PE-ME802I.CO5	UNDERSTAND the Function and use of Maintenance Equipment.	Understand	U
PE-ME802I.CO6	UNDERSTAND the lubrication, Repair & Maintenance Procedures	Understand	U

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	1	3	1	2	1	1	1	1	2	2	2	3
CO2	1	-	1	3	1	2	1	1	1	1	2	2	2	3
CO3	1	-	1	3	1	2	1	1	1	1	2	2	2	3
CO4	1	-	1	2	1	2	1	1	1	1	2	2	2	2
CO5	1	-	1	3	1	2	1	1	1	1	2	2	2	3
CO6	1	-	1	3	1	2	1	1	1	1	2	2	2	3
AVG.	1.0	-	1.0	3.0	1.0	2.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	3.0

Course Title: Industrial Pollution and Control	**Code: OE-ME802D**
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
OE-ME802D.CO1	Describe types of pollution caused by the industries and their effects on the environment	Describe	U
OE-ME802D.CO2	Explain the physical effects, sampling method of air pollution	Explain	U
OE-ME802D.CO3	Discuss the processes and control techniques of air pollution	Discuss	U
OE-ME802D.CO4	Demonstrate the causes, processes and control techniques of water pollution	Demonstrate	P
OE-ME802D.CO5	Learn the physics of sound generation, transmission and physical characteristics of noise	Learn	U
OE-ME802D.CO6	Illustrate measuring instruments, assessment processes and techniques to control the noise pollution	Illustrate	P

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	2	2	-	-	3	1	1	1	-	1	3	2
CO2	1	1	2	2	-	-	3	1	1	1	-	1	3	2
CO3	1	1	2	2	-	-	3	1	1	1	-	1	3	2
CO4	1	1	2	2	-	-	3	1	1	1	-	1	3	2
CO5	1	1	2	2	-	-	3	1	1	1	-	1	3	2
CO6	1	1	2	2	-	-	3	1	1	1	-	1	3	2
AVG.	1	1	2	2	0	0	3	1	1	1	0	1	3	2

Course Title: Total Quality Management	**Code: OE-ME801A**
Type of Course: Theory	**Course Designation: Open Elective**
Semester: 8th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
OE-ME801A.CO1	To express knowledge about various aspects of quality and total quality management	Understand	K2

OE-ME801A.CO2	To understand different tools of TQM and related standards	Understand	K2
OE-ME801A.CO3	To understand quality management philosophies, techniques, and frameworks	Understand	K2
OE-ME801A.CO4	To apply tools and techniques of TQM in manufacturing and service sectors	Apply	K3
OE-ME801A.CO5	To know various quality management tools and their applications	Understand	K2
OE-ME801A.CO6	To Understand the implications of quality management standards and systems	Understand	K2

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	2	3	2	1	1	1	1		1	3	2
CO2	1	1	1	2	3	2	1	1	1	1		1	3	2
CO3	1	1	1	2	3	2	1	1	1	1		1	3	2
CO4	1	2	2	3	3	2	1	1	1	1		1	3	2
CO5	1	2	2	3	3	2	1	1	1	1		1	3	2
CO6	1	2	2	3	3	2	1	1	1	1		1	3	2
AVG.	3	2	2	2.5	3	2	1	1	1	1		1	3	2

SEMESTER – VIII

SESSIONAL

Course Title: Project IV	**Code: PW-ME881**
Type of Course: Sessional	**Course Designation: Compulsory**
Semester: 8th	**Contact Hours: NA**
Continuous Assessment:	**Final Exam:**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PW-ME881.CO1	DEMONSTRATING qualitative solutions to research/industry problems involving contemporary issues.	Create	C
PW-ME881.CO2	FORMULATING hypothesis/design/methodology	Create	C
PW-ME881.CO3	ACQUIRING the knowledge of the techniques, skills, and modern engineering tools necessary for Mechanical Engineering practice	Create	C

PW-ME881.CO4	PRESENTING features of the developed project to the targeted group through written and oral communication.	Create	C
PW-ME881.CO5	CONTRIBUTING in a team in development of technical seminar.	Create	C

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3
AVG.	3	3	3	3	3	3	3	3	3	3	3	3

Course Title: Comprehensive Viva-Voce	**Code: PW-ME882**
Type of Course: Sessional	**Course Designation: Compulsory**
Semester: 8th	**Contact Hours: NA**
Continuous Assessment:	**Final Exam:**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
PW-ME882.CO1	Demonstrate systematic understanding of knowledge related to 4 years study of B. Tech. in ME	Demonstrate	U
PW-ME882.CO2	Apply critical thinking skills to analyze and evaluate complex engineering problems.	Apply	P
PW-ME882.CO3	Demonstrate effective communication skills in presenting technical concepts and ideas to both technical and non-technical audiences.	Demonstrate	U
PW-ME882.CO4	Demonstrate confidence and versatility in answering the varieties of questions posed by a group of interviewers in a moderately short duration.	Demonstrate	U

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	3	3	3	3	3	2	2	1	2	1	2	3
CO2	3	3	3	3	3	2	2	1	2	1	2	3
CO3	1	1	1	1	1	1	1	1	1	3	1	3
CO4	2	2	2	2	2	1	1	1	1	2	1	3

DEPARTMENT OF ECE
SEMESTER – I THEORY

Course Title: Mathematics –IA	**Code: BS-M101**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-M101.CO1	Learn the basic mathematical tools to deal with problems of engineering sciences.	Learn	Level I
BS-M101.CO2	Understand properties and application of Calculus and Linear Algebra .	Understand	Level II
BS-M101.CO3	Analyze of physical or engineering problems.	Analyze	Level IV
BS-M101.CO4	Acquire problem solving skills related to engineering science.	Acquire	Level II
BS-M101.CO5	Apply Calculus and Linear Algebra in real life problems.	Apply	Level III
BS-M101.CO6	Classify ensembles and differentiate between Calculus and Linear Algebra.	Classify	Level IV

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	2
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	1
CO3	3	3	3	2	-	-	-	-	-	-	-	3	2	1
CO4	3	1	2	1	-	-	-	-	-	-	1	3	2	2
CO5	2	2	2	2	-	-	-	-	-	-	2	3	1	-
CO6	3	2	2	2	-	-	-	-	-	-	2	3	-	-
AVG.	2.83	2.33	2.5	2.33	0	0	0	0	0	0	1.6667	3	2	1.5

University Syllabus :

Unit	Content	Hrs/Unit
1	Calculus (Integration): Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.	8
2	Calculus (Dif erentiation): Rolle’s Theorem, Mean value theorems, Taylor’s and Maclaurin’s theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima.	6
3	Matrices: Matrices, Vectors: addition and scalar multiplication, matrix multiplication; Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer’s Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.	7
4	Vector Spaces: Vector Space, linear dependence of vectors, Basis, Dimension; Linear transformations (maps), Range and Kernel of a linear map, Rank and Nullity, Inverse of a linear transformation, Rank- Nullity theorem, composition of linear maps, Matrix associated with a linear map.	9

5	Vector Spaces (Continued): Eigenvalues, Eigenvectors, Symmetric, Skew-symmetric, and Orthogonal Matrices, Eigenbases. Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.	10

Course Title: Physics-I	**Code: BS-PH101**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

Course Outcomes	Details	Action Verb	Knowledge Level
BS-PH101.CO1	Apply basic concepts of mechanics	Apply	K3
BS-PH101.CO2	Discuss Physical optics and analyze principles of lasers with applications	Discuss	K6
BS-PH101.CO3	Categorize di electric and magnetic properties of materials leading to Electromagnetic laws	Categorize	K4
BS-PH101.CO4	Differentiate between Classical Physics and Quantum Physics by introducing Planck's law	Differentiate	K5
BS-PH101.CO5	Apply wave particle duality in real life problems followed by simple quantum mechanics calculations	Apply	K3
BS-PH101.CO6	Classify ensembles and differentiate between classical and Quantum statistical mechanics	Classify	K4

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO5	1	3	2	0	-	-	-	-	-	-	-	-	-	-
CO6	-	1	3	2	-	-	-	-	-	-	-	-	-	-
AVG.	1.80	2.33	1.83	1.00	0	0	0	0	0	0	0	0	0	0

University Syllabus :

Unit	Content	Hrs/Unit
1	Mechanics (7L) Problems including constraints & friction. Basic ideas of vector calculus and partial differential equations. Potential energy function F = -grad V, equipotential surfaces and meaning of gradient. Conservative and non-conservative forces. Conservation laws of energy & momentum. Non-inertial frames of reference. Harmonic oscillator; Damped harmonic motion forced oscillations and resonance. Motion of a rigid body in a plane and in 3D. Angular velocity vector. Moment of inertia.	7

2	Optics (5L) Distinction between interference and diffraction, Fraunhofer and Fresnel diffraction, Fraunhofer diffraction at single slit, double slit, and multiple slits (only the expressions for max;min, & intensity and qualitative discussion of fringes); diffraction grating(resolution formulac only), characteristics of diffration grating and its applications. Polarisation : Introduction, polarisation by reflection, polarisation by double reflection, scattering of light, circular and elliptical polarisation, optical activity. Lasers : Principles and working of laser : population inversion, pumping, various modes, threshold population inversion with examples .	5

3	Electromagnetism and Dielectric Magnetic Properties of Materials (8L) Maxwell's equations. Polarisation, permeability and dielectric constant, polar and non-polar dielecrrics, internal fields in a solid, Clausius- Mossotti equation(expression only), applications of dielectrics. Magnetisation , permeability and susceptibility, classificationof magnetic materials, ferromagnetism, magnetic domains and hysteresis, applications.	8
4	Quantum Mechanics (16L) Introduction to quantum physics, black body radiation, explanation using the photon concept, Compton effect, de Broglie hypothesis, wave-particle duality, verification of matter waves, uncertainty principle, Schrodinger wave equation, particle in box, quantum harmonic oscillator, hydrogen atom.	16
5	Statistical Mechanics (8L) Macrostate, Microstate, Density of states, Qualitative treatment of Maxwell Boltzmann, Fermi-Dirac and Bose-Einstein statistics.	8

Course Title: Basic Electrical Engineering	**Code: ES-EE101**
Type Of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-EE101.CO1	Understand and analyze basic electric and magnetic circuits.	Understand	K2
ES-EE101.CO2	Study the working principles of electrical machines and power converters.	Study	K1
ES-EE101.CO3	Introduce the components of low voltage electrical installations.	Introduce	K1
ES-EE101.CO4	Understand the general structure of electrical power system.	Understand	K2
ES-EE101.CO5	Understand the construction and operation of single-phase transformer.	Understand	K2
ES-EE101.CO6	Explain the working principle of power converters.	Explain	K2

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO2	2	3	3	2	2	-	-	-	-	-	-	-	-	-
CO3	2	-	3	1	-	-	-	-	-	-	-	1	-	-
CO4	2	-	2	2	3	-	-	-	-	-	-	2	-	-
CO5	2	2	-	2	3	-	-	-	-	-	-	1	-	-
CO6	2	1	3	3	3	-	-	-	-	-	-	1	-	-
AVG.	2.17	2	2.75	2	2.6	0	0	0	0	0	0	1.25	0	0

University Syllabus :

Unit	Content	Hrs/Unit
1	DC Circuits (8 hours) Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.	8

2	AC Circuits (8 hours) Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections.	8

3	Transformers (6 hours) Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto- transformer and three-phase transformer connections.	6
4	Electrical Machines (8 hours) Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.	8
5	Power Converters (6 hours) DC-DC buck and boost converters, duty ratio control. Single- phase and three-phase voltage source inverters; sinusoidal modulation	6
6	Electrical Installations (6 hours) Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.	6

SEMESTER – I
PRACTICAL

Course Title: Physics-I Laboratory	**Code: BS-PH191**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-PH191.CO1	Observe and read data in slide calliper's, screw gauge. Calculate different modulus of elasticity to apply basic knowledge Physics of Elasticity and apply viscosity principle of streamline motion of water to calculate its viscosity coefficient required in fluid mechanics	Observe	K1
BS-PH191.CO2	Arrange sequential connection in electrical experiment to verify principles of Kirchhoff's law to verify passive elements of electrical circuit	Arrange	K3
BS-PH191.CO3	Operate optical instruments to illustrate physical properties of light and to observe spectral lines of light to verify medium specific characteristics. Calculate Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant	Operate	K3
BS-PH191.CO4	Determine Band Gap and Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors. Determine the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.	Determine	K5
BS-PH191.CO5	Apply concepts of quantum mechanics to verify Bohr's atomic orbital theory	Apply	K3

BS-PH191.CO6	Determine Planck's constant and Stefan's constant applying modern Physics	Determine	K5

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	1	1	-	-	-	-	-	-	-	-	-	-
CO2	2	3	1	1	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	1	-	-	-	-	-	-	-	-	-	-
CO4	2	3	1	2	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	1	-	-	-	-	-	-	-	-	-	-
CO6	2	1	3	2	-	-	-	-	-	-	-	-	-	-
AVG.	2	2.33	2	1.33	0	0	0	0	0	0	0	0	0	0

University Syllabus :

Choose 10 experiments including at least one from Optics, Electricity and Magnetism and Quantum Mechanics and at least a total of six from these three groups.

Unit	Content
1	Experiments in Optics 1. Determination of dispersive power of the material of a prism 2. Determination of wavelength of a monochromatic light by Newton’s ring 3. Determination of wavelength of a monochromatic light by Fresnel’s bi-prism 4. Determination of wavelength of the given laser source by diffraction method
2	Electricity & Magnetism experiments 1. Determination of thermo electric power of a given thermocouple. 2. Determination of specific charge (e/m) of electron by J.J. Thompson’s method. 3. Determination of dielectric constant of a given dielectric material. 4. Determination of Hall coefficient of a semiconductor by four probe method. 5. To study current voltage characteristics, load response, areal characteristic and spectral response of a photovoltaic solar cell. 6. Determination of resistance of ballistic galvanometer by half deflection method and study of variation of logarithmic decrement with series resistance. 7. Determination of unknown resistance using Carey Foster’s bridge 8. Study of Transient Response in LR, RC and LCR circuits using expeyes 9. Generating sound from electrical energy using expeyes
3	Experiments in Quantum Physics 1. Determination of Stefan-Boltzmann constant. 2. Determination of Planck constant using photocell. 3. Determination of Lande-g factor using Electron spin resonance spectrometer. 4. Determination of Rydberg constant by studying Hydrogen spectrum. 5. Determination of Band gap of semiconductor. 6. To study current voltage characteristics, load response, areal characteristic and spectral response of a photovoltaic solar cell.
4	Miscellaneous experiments 1. Determination of Young’s modulus of elasticity of the material of a bar by the method of flexure 2. Determination of bending moment and shear force of a rectangular beam of uniform cross-section 3. Determination of modulus of rigidity of the material of a rod by static method 4. Determination of rigidity modulus of the material of a wire by dynamic method 5. To determine the moment of inertia of a body about an axis passing through its centre of gravity and to determine the modulus of rigidity of the material of the suspended wire 6. Determination of coefficient of viscosity by Poiseulle’s capillary flow method

Course Title: Basic Electrical Engineering Lab	Code: ES-EE191
Type of Course: Practical	Course Designation: Compulsory
Semester: 1st	Contact Hours: 2P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	credits 3

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-EE191.CO1	Calibrate Ammeter and Wattmeter	Calibrate	**K3**
ES-EE191.CO2	Demonstrate the measuring instrument and electrical machines	Demonstrate	K3
ES-EE191.CO3	Conduct open circuit and short circuit test of single-phase transformer	Conduct	K2
ES-EE191.CO4	Measure 3 phase power using two wattmeters	Measure	**K5**
ES-EE191.CO5	Identify the components of LT switchgear	Identify	K1
ES-EE191.CO6	Understand the characteristic of RLC series and parallel circuit	Understand	K2

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	3	-	-	-	2	-	-	-	-	-
CO2	2	3	3	1	2	-	-	-	3	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	2	-	-	-	-	-
CO4	2	-	2	-	3	-	-	-	3	-	-	-	-	-
CO5	1	-	-	-	1	-	-	-	-	-	-	-	-	-
CO6	2	1	2	1	3	-	-	-	2	-	-	-	-	-
AVG.	1.83	2	2.5	1	2.4	0	0	0	2.4	0	0	0	0	0

University Syllabus :

Choose 10 experiments from the following:

Unit	Content
1	First activity: Introduction to basic safety precautions and mentioning of the do's and Don'ts. Noting down list of experiments to be performed, and instruction for writing the laboratory reports by the students. Group formation. Students are to be informed about the modalities of evaluation.
2	Introduction and uses of following instruments : (a) Voltmeter (b) Ammeter (c) Multimeter (d) Oscilloscope Demonstration of real life resistors, capacitors with color code , inductors and autotransformer.
3	Demonstration of cut-out sections of machines: DC machine, Induction machine, Synchronous machine and single phase induction machine.
4	Calibration of ammeter and Wattmeter.
5	Determination of steady state and transient response of R-L, R-C and R-L-C circuit to a step change in voltage.
6	Determination of steady state response of R-L and R-C and R-L-C circuit and calculation of impedance and power factor.
7	Determination of resonance frequency and quality factor of series and parallel R-L-C circuit.
8	(a) Open circuit and short circuit test of a single-phase transformer (b) Load test of the transformer and determination of efficiency and regulation

9	Demonstration of three phase transformer connections. Voltage and current relationship, phase shifts between the primary and secondary side.
10	Measurement of power in a three phase unbalanced circuit by two wattmeter method.
11	Determination of Torque –Speed characteristics of separately excited DC motor.

12	Determination of Torque speed characteristics and observation of direction reversal by change of phase sequence of connection of Induction motor.
13	Determination of operating characteristics of Synchronous generator.
14	Demonstration of operation of (a) DC-DC converter (b) DC-AC converter (c) DC-AC converter for speed control of an Induction motor.
15	Demonstration of components of LT switchgear.

Course Title: Workshop	**Code: ES-ME192**
Type Of Course: Practical	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 1L+4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-ME192.CO1	Understanding the applications of hand tools and machine tools.	Understand	K2
ES-ME192.CO2	Comprehend the safety measures required to be taken while using the tools.	Comprehend	K2
ES-ME192.CO3	Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.	Select	K2
ES-ME192.CO4	Fabricate components with their own hands	Fabricate	K6
ES-ME192.CO5	Practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes	Analyze	K6
ES-ME192.CO6	Produce small devices of their interest, by assembling different components,	Produce	K6

Mapping of COs with Pos and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	1	-	1	-	-	-	-	-	-
CO3	1	-	-	-	-	1	-	1	1	-	-	-	-	-
CO4	1	-	-	-	-	-	2	-	2	1	1	-	-	1
CO5	1	-	-	-	-	-	2	-	2	1	1	1	-	-
CO6	1	-	-	-	-	-	2	-	2	1	2	1	-	1
AVG.	1	0	0	0	0	1	2	1	1.75	1	1.33	1	0	1

University Syllabus :

Unit	Content

1	**Lectures & videos: Detailed contents:** 1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods 2. CNC machining, Additive manufacturing 3. Fitting operations & power tools 4. Electrical &Electronics 5. Carpentry 6. Plastic moulding, glass cutting

	7. Metal casting 8. Welding (arc welding & gas welding), brazing
2	**Workshop Practice:** **Machine shop (8 hours)** Typical jobs that may be made in this practice module: To make a pin from a mild steel rod in a lathe. To make rectangular and vee slot in a block of cast iron or mild steel in a shaping and / or milling machine. Fitting shop (8 hours) Typical jobs that may be made in this practice module: To make a Gauge from MS plate. **Carpentry (8 hours)** Typical jobs that may be made in this practice module: To make wooden joints and/or a pattern or like. **Welding shop (8 hours (Arc welding 4 hrs + gas welding 4 hrs))** Typical jobs that may be made in this practice module: ARC WELDING (4 hours): To join two thick (approx 6mm) MS plates by manual metal arc welding. GAS WELDING (4 hours): To join two thin mild steel plates or sheets by gas welding. **Casting (8 hours)** Typical jobs that may be made in this practice module: One/ two green sand moulds to prepare, and a casting be demonstrated. Smithy (4 hours) Typical jobs that may be made in this practice module: A simple job of making a square rod from a round bar orlike. **Plastic moulding & Glass cutting (4 hours)** Typical jobs that may be made in this practice module: For plastic moulding, making at least one simple plastic component should be made. For glass cutting, three rectangular glass pieces may be cut to make a kaleidoscope using a black colour diamond cutter, or similar other components may be made. Electrical &**Electronics (8 hours) Familiarization with LT switchgear elements, making its sketches and noting down its specification.** Kitkat fuse, Glass cartridge fuse, Plastic fuse holders (optional), Iron clad isolators, MCB style isolators, Single phase MCB, Single-phase wire, wiring cable. Demonstration of domestic wiring involving two MCB, two piano key switches, one incandescent lamp, one LED lamp and plug point. Simple wiring exercise to be executed to understand the basic electrical circuit. Simple soldering exercises to be executed to understand the basic process ofsoldering. Fabrication of a single-phase full wave rectifier with a step down transformer using four diodes and electrolytic capacitor and to find its volt-ampere characteristics to understand basic electronic circuit fabrication.

SEMESTER – II
THEORY

Course Title: Chemistry-I	Code: BS-CH 201
Type of Course: Theory	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 3L+1T/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	credits 3

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-CH 201.CO1	Apply first and second law of thermodynamics to different chemical and physical processes under specified condition to determine the equilibrium condition, spontaneity and thermo-chemical behaviour of a reaction.	Apply	K3
BS-CH 201.CO2	Using the concept of conductance of ions analyze the design and working principle of different electrochemical cells.	Use	K3
BS-CH 201.CO3	Derive rate of a reaction at a specified temperature under different medium	Derive	K4
BS-CH 201.CO4	Explain the mechanism considering the structure of the molecules and type of electronic effect present in them.	Explain	K5
BS-CH 201.CO5	Analyze different types of fuels for industrial application.	Analyze	K4
BS-CH 201.CO6	Distinguish different types of polymer for diverse application.	Distinguish	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO5	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO6	3	1	1	1	-	-	-	-	-	-	-	-	-	-
AVG.	3	1.66	1	1	0	0	0	0	0	0	0	0	0	0

University Syllabus :

Unit	Content	Hrs/Unit
1	**Atomic and molecular structure (10 lectures)** Schrodinger equation. Particle in a box solutions and their applications for simple sample. Molecular orbitals of diatomic molecules (e.g.H2). Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.	10

2	**Spectroscopic techniques and applications (8 lectures)** Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.	8

3	**Intermolecular forces and potential energy surfaces (4 lectures)** Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena	4
4	**Use of free energy in chemical equilibria (8 lectures)** First and second laws of thermodynamics and thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams	8
5	**Periodic properties (4 Lectures)** Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries	4
6	**Stereochemistry (4 lectures)** Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compound	4
7	**Organic reactions and synthesis of a drug molecule (4 lectures)** Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.	4

Course Title:Mathematics –IIA	**Code: BS-M201**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-M201.CO1	Learn the basic mathematical tools to deal with problems of engineering sciences.	Learn	K1
BS-M201.CO2	Understand properties and application of Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.	Understand	K2
BS-M201.CO3	Analyze of physical or engineering problems.	Analyze	K4
BS-M201.CO4	Acquire problem solving skills related to engineering science.	Acquire	K2
BS-M201.CO5	Apply Linear Algebra, Ordinary Differential Equations (ODE) and Numerical analysis in real life problems.	Apply	K3
BS-M201.CO6	Classify ensembles and differentiate among Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.	Classify	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	-	-	-	-	-	-	-	3	1	-
CO2	2	2	3	1	-	-	-	-	-	-	-	3	2	-
CO3	3	3	3	1	-	-	-	-	-	-	-	3	1	-
CO4	3	2	3	2	-	-	-	-	-	-	1	3	3	1
CO5	3	2	3	2	-	-	-	-	-	-	2	3	3	-1
CO6	3	2	3	2	-	-	-	-	-	-	2	3	3	2
AVG.	2.83	2.17	3	1.5	0	0	0	0	0	0	1.67	3.00	2.17	1.33

University Syllabus :

Unit	Content	Hrs/Unit
1	**Basic Probability:** Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the Multinomial distribution, Poisson approximation to the Binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.	11
2	**Continuous Probability Distributions:** Continuous random variables and their properties, Distribution functions and densities, Normal, Exponential and Gamma densities.	4
3	**Bivariate Distributions:** Bivariate distributions and their properties, distribution of sums and quotients, Conditional densities, Bayes' rule.	5

4	**Basic Statistics:** Measures of Central tendency, Moments, Skewness and Kurtosis, Probability distributions: Binomial, Poisson and Normal and evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation	8
5	**Applied Statistics:** Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for	8

	single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.	
6	**Small samples:** Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.	4

Course Title:Programming for ProblemSolving	**Code: ES-CS201**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-CS201.CO1	Analyze the problem and formulate algorithms for them.	Analyze	K4
ES-CS201.CO2	Translate the algorithms to programs (in C language).	Understand	K2
ES-CS201.CO3	Understand the correct syntax of logical expression, branch instruction, iteration,	Understand	K2
ES-CS201.CO4	Apply array and pointer to solve problem.	Apply	K3
ES-CS201.CO5	Understand the use of , function, recursion.	Understand	K2
ES-CS201.CO6	Build analytical skill.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	3	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO4	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	3	3	3	2	1	1	1	1	1	2	2	2.33	2.33

University Syllabus :

Unit	Content	Hrs/Unit
1	**Introduction to Programming** (4 lectures) Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) - (1 lecture). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. (1 lecture) From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code- (2 lectures)	8
2	**Arithmetic expressions and precedence** (2 lectures)	2
3	**Conditional Branching and Loops** (6 lectures) Writing and evaluation of conditionals and consequent branching (3 lectures) Iteration and loops (3 lectures)	6
4	**Arrays** (6 lectures) Arrays (1-D, 2-D), Character arrays and Strings	6

5	**Basic Algorithms** (6 lectures) Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)	6
6	**Function** (5 lectures) Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference	5

7	**Recursion** (4 -5 lectures) Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.	5
8	**Structure** (4 lectures) Structures, Defining structures and Array of Structures	4
9	**Pointers** (2 lectures) Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)	2
10	**File handling** (only if time is available, otherwise should be done as part of the lab)	

Course Title:English	**Code: HM-HU201**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 2L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HM-HU201.CO1	Understand and apply English Speech Sounds for enhancing English Communication	Understand	K2
HM-HU201.CO2	Apply English Language Presentation Skill in Academic and in Professional Communication	Apply	K3
HM-HU201.CO3	Apply Receptive Skills of English in Academics and in Engineering Profession	Apply	K3
HM-HU201.CO4	Apply Writing Skill of English in Academics and in Profession	Apply	K3
HM-HU201.CO5	Apply Grammar Skill of English in Academic and in Professional Communication	Apply	K3
HM-HU201.CO6	Apply Critical Thinking Skill of English in Academic and in professional Communication	Apply	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO2	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO3	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO4	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO5	2	2	2	2	2	2	-	2	-	3	-	2	1	1
CO6	2	2	2	2	2	2	-	2	-	3	-	2	1	1
AVG.	2	2	2	2	2	2	0	2	0	3	0	2	1	1

University Syllabus :

Unit	Content
1	**Vocabulary Building** The concept of Word Formation: Compounding, Backformation, Clipping, Blending. Root words from foreign languages and their use in English Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms, and standard abbreviations: Acronyms

2	**Basic Writing Skills** Sentence Structures & Types: Simple, Compound, Complex Use of phrases and clauses in sentences: Transformation of sentences, active, passive, narration Importance of proper punctuation

	Creating coherence: Arranging paragraphs & Sentences in logical order Creating Cohesion: Organizing principles of paragraphs in documents Techniques for writing precisely
3	**Identifying Common Errors in Writing** Subject-verb agreement Noun-pronoun agreement Misplaced modifiers Articles Prepositions Redundancies Clichés
4	**Nature and Style of sensible Writing** Describing Defining Classifying Providing examples or evidence Writing introduction and conclusion
5	**Writing Practices** Comprehension Précis Writing Essay Writing Business Letter, Cover Letter & CV; E-mail

SEMESTER – II
PRACTICAL

Course Title:Chemistry-I Laboratory	Code: BS-CH291
Type of Course: Practical	Course Designation: Compulsory
Semester: 2^{nd}	Contact Hours: 3P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	credits 3

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
BS-CH291.CO1	Determine some physical parameter like viscosity of a solution and rate constant of a reaction	Determine	K5
BS-CH291.CO2	Determine the strength of an acid using conductometric method.	Determine	K5
BS-CH291.CO3	Determine the strength of an acid using pH metric method.	Determine	K5
BS-CH291.CO4	Determine partition coefficient of a compound	Determine	K5
BS-CH291.CO5	Estimate the amount of an ion present in a given solution using permanganometric and argentometric methods.	Estimate	K5
BS-CH291.CO6	Evaluate alkalinity (in terms of CaCO3 equvalent), hardness (in ppm) and amount of dissolved oxyzen (in mg/l) present in a given water sample using volumetric method.	Evaluate	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO2	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO3	1	1	2	3	-	-	-	-	-	-	-	-	-	-
CO4	1	2	2	3	-	-	-	-	-	-	-	-	-	-
CO5	1	2	2	3	-	-	-	-	-	-	-	-	-	-
CO6	1	2	2	3	-	-	-	-	-	-	-	-	-	-
AVG.	1	1.5	2	3	0	0	0	0	0	0	0	0	0	0

University Syllabus :

Choose 10 experiments from the following:

Unit	Content
1	Conductometric titration for determination of the strength of a given HCl solution by titration against a standard NaOH solution.
2	pH- metric titration for determination of strength of a given HCl solution against a standard NaOH solution
3	Determination of dissolved oxygen present in a given water sample
4	To determine chloride ion in a given water sample by Argentometric method (using chromate indicator solution)
5	Determination of surface tension and viscosity
6	Thin layer chromatography

7	Ion exchange column for removal of hardness of water
8	Determination of the rate constant of a reaction
9	Determination of cell constant and conductance of solutions`
10	Potentiometry - determination of redox potentials and emfs

11	Saponification/acid value of an oil
12	Chemical analysis of a salt
13	Determination of the partition coefficient of a substance between two immiscible liquids
14	Adsorption of acetic acid by charcoal
15	Use of the capillary viscosimeters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg.

Course Title:Programming for ProblemSolving	**Code: ES-CS291**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-CS291.CO1	Analyze the problem and formulate algorithms for them.	Analyze	K4
ES-CS291.CO2	Translate the algorithms to programs (in C language).	Understand	K2
ES-CS291.CO3	Understand the correct syntax of logical expression, branch instruction, iteration,	Understand	K2
ES-CS291.CO4	Apply array and pointer to solve problem.	Apply	K3
ES-CS291.CO5	Understand the use of , function, recursion.	Understand	K2
ES-CS291.CO6	Build analytical skill.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO2	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO3	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO4	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO5	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO6	2	2	2	2	-	-	-	-	-	-	-	2	2	1
AVG.	2	2	2	2	0	0	0	0	0	0	0	2	2	1

University Syllabus :

The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.

Unit	Content
1	Tutorial 1: Problem solving using computers: Lab1: Familiarization with programming environment
2	Tutorial 2: Variable types and type conversions: Lab 2: Simple computational problems using arithmetic expressions
3	Tutorial 3: Branching and logical expressions: Lab 3: Problems involving if-then-else structures
4	Tutorial 4: Loops, while and for loops: Lab 4: Iterative problems e.g., sum of series

5	Tutorial 5: 1D Arrays: searching, sorting: Lab 5: 1D Array manipulation
6	Tutorial 6: 2D arrays and Strings Lab 6: Matrix problems, String operations

7	Tutorial 7: Functions, call by value: Lab 7: Simple functions
8	Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration): Lab 8 and 9: Programming for solving Numerical methods problems
9	Tutorial 10: Recursion, structure of recursive calls Lab 10: Recursive functions
10	Tutorial 11: Pointers, structures and dynamic memory allocation Lab 11: Pointers and structures
11	Tutorial 12: File handling: Lab 12: File operations

Course Title:Engineering Graphics & Design	**Code: ES-ME291**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 2^{nd}	**Contact Hours: 1L+4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
ES-ME291.CO1	Understand the applications of hand tools and machine tools.	Understand	K2
ES-ME291.CO2	Comprehend the safety measures required to be taken while using the tools.	Create	K6
ES-ME291.CO3	Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.	Evaluate	K5
ES-ME291.CO4	Fabricate components with their own hands.	Create	K6
ES-ME291.CO5	Confident on practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.	Understand	K2
ES-ME291.CO6	Produce small devices of their interest by assembling different components.	Create	K6

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	1	-	1	-	-	-	-	-	-
CO3	1	-	-	-	-	1	-	1	1	-	-	-	-	-
CO4	1	-	-	-	-	-	2	-	2	1	1	-	-	1
CO5	1	-	-	-	-	-	2	-	2	1	1	1	-	-
CO6	1	-	-	-	-	-	2	-	2	1	2	1	-	1
AVG.	1	0	0	0	0	1	2	1	1.75	1	1.333	1	0	1.00

University Syllabus :

Unit	Content
1	**INTRODUCTION TO ENGINEERING DRAWING** Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Different types of lines and their use; Drawing standards and codes
2	**LETTERING, DIMENSIONING, SCALES** Plain scale, Diagonal scale and Vernier Scales.
3	**GEOMETRICAL CONSTRUCTION AND CURVES** Construction of polygons, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid, Involute, Archemedian Spiral.
4	**PROJECTION OF POINTS, LINES, SURFACES** Principles of Orthographic Projections-Conventions - 1st and 3rd angle projection, Projections of Points and lines inclined to both planes; Projections of planes (Rectangle, pentagon, Hexagon etc.) inclined Planes - Auxiliary Planes.
5	**PROJECTION OF REGULAR SOLIDS** Regular solids inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale (Cube, Pyramid, Prism, Cylinder, Cone).
6	**COMBINATION OF REGULAR SOLIDS, FLOOR PLANS** Regular solids in mutual contact with each other like Spheres in contact with cones standing on their base. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.
7	**ISOMETRIC PROJECTIONS** Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;
8	**SECTIONS AND SECTIONAL VIEWS OF RIGHT ANGULAR SOLIDS** Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)
9	**OVERVIEW OF COMPUTER GRAPHICS, CUSTOMISATION& CAD DRAWING** listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids]; Set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;
10	**ANNOTATIONS, LAYERING & OTHER FUNCTIONS** applying dimensions to objects, applying annotations to drawings; 10 Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer- aided design (CAD) software modeling of parts and assemblies. Parametric and non- parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;
11	**DEMONSTRATION OF A SIMPLE TEAM DESIGN PROJECT** Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid- modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM)

Course Title: Language Laboratory	Code: HM-HU291
Type of Course: Practical	Course Designation: Compulsory
Semester: 2nd	Contact Hours: 2P/week
Continuous Assessment: 40 Marks	Final Exam: 60 Marks
Writer: Course Coordinator	credits 3

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
HM-HU291.CO1	Understand and apply English Speech Sounds for enhancing English Communication	Understand	K2
HM-HU291.CO2	Apply English Language Presentation Skill in Academic and in Professional Communication	Apply	K3
HM-HU291.CO3	Apply Receptive Skills of English in Academics and in Engineering Profession	Apply	K3
HM-HU291.CO4	Apply Writing Skill of English in Academics and in Profession	Apply	K3
HM-HU291.CO5	Apply Grammar Skill of English in Academic and in Professional Communication	Apply	K3
HM-HU291.CO6	Apply Critical Thinking Skill of English in Academic and in professionional Communication	Apply	K3

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO2	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO3	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO4	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO5	2	2	2	2	2	2	-	2	1	3	-	2	1	1
CO6	2	2	2	2	2	2	-	2	1	3	-	2	1	1
AVG.	2	2	2	2	2	2	0	2	1	3	0	2	1	1

University Syllabus :

Unit	Content
1	Honing ‘Listening Skill’ and its sub skills through Language Lab Audio device;
2	Honing ‘Speaking Skill’ and its sub skills
3	Helping them master Linguistic/Paralinguistic features (Pronunciation/Phonetics/ Voice modulation/ Stress/ Intonation/ Pitch &Accent) of connected speech
4	Honing ‘Conversation Skill’ using Language Lab Audio –Visual input; Conversational Practice Sessions (Face to Face / via Telephone, Mobile phone & Role Play Mode)
5	Introducing ‘Group Discussion’ through audio –Visual input and acquainting them with key strategies for success
6	G D Practice Sessions for helping them internalize basic Principles (turn- taking, creative intervention, by using correct body language, courtesies & other soft skills) of GD
7	Honing ‘Reading Skills’ and its sub skills using Visual / Graphics/ Diagrams /Chart Display/Technical/Non Technical Passages Learning Global / Contextual / Inferential Comprehension;
8	Honing ‘Writing Skill’ and its sub skills by using Language Lab Audio –Visual input; Practice Sessions

SEMESTER – III
THEORY

Course Title: **Electronic Devices**	Code: EC301
Type of Course: Theory	Course Designation: Compulsory
Semester: 3rd	Contact Hours:
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	credits 3

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Energy bands & Current Carriers in Semiconductors: Bonding Forces in Solids, Energy Bands theory in crystals (Qualitative Analysis), Metals, Semiconductors, & Insulators, Fermi-Level, Intrinsic and Extrinsic Semiconductors, Concept of Holes, Carrier Concentration.	Explain	K2
CO2	drift of carriers, continuity equation, Injected minority carrier charge, Recombination and generation of charge carriers. Generation and recombination of carriers	Define	K1
CO3	. P-N junction: Physical Description of p-n junction, Basic device technologies for fabrication of a p-n junction, I-V characteristics, and small signal switching models; Avalanche breakdown, Zener diode, Schottky diode	Demonstrate	K2
CO4	. Bipolar Junction Transistor: Basic Construction, I-V characteristics, Ebers-Moll Model	Explain	K2
.CO5	. Opto–Electronics: Optical absorption in semiconductors, photovoltaic effects, solar cells (p-n junction), Photoconductors, Photodiode, PIN photodiode, Avalanche photodiode, Phototransistor, LED, Semiconductor Laser (p-n junction)	Build	K6
CO6	Integrated circuit: fabrication process: oxidation, diffusion, ion implantation, photolithography, etching, chemical vapor deposition, sputtering, twin-tub CMOS process.	Explain	K2

Course Title: **Digital System Design**	Code: EC302
Type of Course: Theory	Course Designation: Compulsory
Semester: 3rd	Contact Hours: 3L/week
Continuous Assessment: 25 Marks	Final Exam: 70 Marks
Writer: Course Coordinator	credits 3

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
.CO1	Design and analyze combinational logic circuits	Construct	K3

.CO2	Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder	Understand	K2
.CO3	. Design & analyze synchronous sequential logic circuits	Categorize	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3
CO2	3	3	3	3	-	1	1	1	1	1	2	2	3	3
CO3	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO4	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO5	3	3	3	3	-	-	-	-	1	1	-	2	2	2
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2
AVG.	3	3	3	3	2	1	1	1	1	1	2	2.00	2.33	2.33

Course Title: Signals and System	**Code: EC303**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3^{rd}	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
.CO1	Analyze different types of signals	Illustrate	K2
.CO2	Represent continuous and discrete systems in time and frequency domain using different transforms	Demonstrate	K2
.CO3	Investigate whether the system is stable	Define	K1
CO4	Sampling and reconstruction of a signal	Distinguish	K4

Course Title: Network Theory	**Code: EC304**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3^{rd}	**Contact Hours: 2L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Understand basics electrical circuits with nodal and mesh analysis	Apply	K3
	Appreciate electrical network theorems		

CO2		Learn	K2
.CO3	. Apply Laplace Transform for steady state and transient analysis.	Apply	K3
CO4	Determine different network functions.	Apply	K3
CO5	Appreciate the frequency domain techniques.	Solve	K3

Course Title: Data Structure & Algorithms	**Code: ES-CS301**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness..	Understand	K2
CO2	2. For a given Search problem (Linear Search and Binary Search) student will able to implement it	Apply	K3
CO3	. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.	Solve	K3
CO4	Evaluate the effect of inflation,deflation and price change with indexes in Engineering Economic Analysis	Evaluate	K5
CO5	Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.	Analyze	K4
CO6	. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.	Understand	K2

Course Title: Probality and Satistics	**Code: BS-M301**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	.. The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.	Understand	K2
CO2	The basic ideas of statistics including measures of central tendency, correlation and regression.	Apply	K3

CO3	. The statistical methods of studying data samples.	Solve	K3
CO4	Evaluate the effect of inflation,deflation and price change with indexes in Engineering Economic Analysis	Evaluate	K5
CO5	Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.	Analyze	K4
CO6	. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.	Understand	K2

SEMESTER – III
PRACTICAL

Course Title: Electronics Devices Lab	**Code: EC391**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**credits 1**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	identifying and study of different components like resistor, capacitors, diodes, LED, Transistors, FET(JFET & MOSFET) etc 2. Study of different instruments used in the laboratories like, power supply, Oscilloscope, Multi.	Understand	K2
.CO2	CHARACTERISTICS OF PN JUNCTION DIODE a) To Plot the Volt Ampere Characteristics of PN Junction Diode under Forward and Reverse Bias Conditions. b) To find the Cut-in voltage, Static Resistance, Dynamic Resistance for Forward Bias & Reverse Bias	Understand	K2
CO3	CHARACTERISTICS OF ZENER DIODE & LOAD REGULATION a) To Obtain the Forward Bias and Reverse Bias characteristics of a Zener diode. b) Find out the Zener Break down Voltage from the Characteristics. c) To Obtain the Load Regulation Characteristics. 5. COMMON BASE BIPOLAR TRANSISTOR CHARACTERISTICS a) To plot the Input and Output characteristics of a transistor connected in Common Base Configuration and to find the h – parameters from the characteristics.	Apply	K3
CO4	Ability to understand properties of photoelectric devices	Analyze	K4

.CO5	Ability to measure and record the experimental data, analyze the results, and prepare a formal laboratory report	Identify	K3

Course Title: Digital System Design Lab	**Code: EC392**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**credits 1**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
.CO1	Introduction to Digital Electronics Lab- Nomenclature of Digital Ics, Specifications, Study of the Data Sheet, Concept of Vcc and Ground, Verification of the Truth Tables of Logic Gates using TTL ICs. Implementation of the Given Boolean Function using Logic Gates in Both Sop and Pos Forms.Verification of State Tables of Rs, J-k, T and D Flip-Flops using NAND & NOR Gates	Construct	K3
.CO2	Implementation and Verification of Decoder/De-Multiplexer and Encoder using Logic Gates. Implementation of 4x1 Multiplexer using Logic Gates	Understand	K2
.CO3	Design, and Verify the 4-Bit Asynchronous Counter	Categorize	K4
.CO4	Simulation of MOS Inverter with different loads using PSPICE software Simulation of CMOS Inverter for different parameters Kn, Kp as a design variable in suitable	Learn	K3
.CO5	Design of a 4-bit Multiplexer using VHDL\Verilog.	Compare	K5
.CO6	Design of a 3-input NAND gate and its simulation using suitable logic simulator	Understand	K2

Course Title: Data Structure & Algorithm Lab.	**Code: ES-CS391**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**credits 1**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Stacks and Queues: adding, deleting elements Circular Queue: Adding & deleting elements Merging Problem : Evaluation of expressions operations on Multiple stacks & queues	Understand	K2
.CO2	. Implementation of linked lists: inserting, deleting, and inverting a linked list. Implementation of stacks & queues using linked lists	Design	K6

.CO3	. Polynomial addition, Polynomial multiplication Sparse Matrices : Multiplication, addition.	Analyze	K4
.CO4	Recursive and Nonrecursive traversal of Trees Threaded binary tree traversal. AVL tree implementation	Implement	K3
CO5	Application of Trees. Application of sorting and searching algorithms Hash tables implementation: searching, inserting and deleting, searching & sorting techniques.	Design	K6
.CO6	Threaded binary tree traversal. AVL tree implementation	Implement	K3

Course Title: Environmental Science	**Code: MC381**
Type of Course: Practical	**Course Designation: Sessional**
Semester: 3rd	**Contact Hours: 4P/week**
Continuous Assessment: 0 Marks	**Final Exam: 100 Marks**
Writer: Course Coordinator	**credits 0**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Small group meetings about water management, promotion of recycle use, generation of less waste, avoiding electricity waste	Interpret	K2
CO2	ii) Poster making event iv) Cycle rally v) Lectures from experts.	Make use of	K3
.CO3	Plantation ii) Gifting a tree to see its full growth iii) Cleanliness drive	Define	K1
CO4	Drive for segregation of waste v) To live some big environmentalist for a week or so to understand his work	Discover	K4
.CO5	. To work in kitchen garden for mess vii) To know about the different varieties of plants	Explain	K5
CO6	Shutting down the fans and ACs of the campus for an hour or so	Discuss	K6

SEMESTER – IV
THEORY

Course Title: Analog Communication	**Code: EC401**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
.CO1	. The learner must be able to appreciate the need for modulation and calculate the antenna size for different carrier frequencies. From the functional representation of the modulated carrier wave,	Define	K1

	the learner must be able to identify the type of modulation, calculate the side-band frequencies, identify the modulating and carrier frequencies, decide the type of generation method to be adopted. Solve problems.		
CO2	. After understanding the basic concepts the learner must be able to compare between the different demodulation methods, design an envelope detector, calculate the IF and image frequencies for the superheterdyne receivers given the carrier and modulating frequencies, calculate the oscillator frequency.	Demonstrate	K2
CO3	: From the functional representation of the modulated carrier wave, the learner must be able to identify the type of modulation, calculate the side-band frequencies, identify the modulating and carrier frequencies, decide the type of generation method to be adopted. Solve problems	Solve	K3
.CO4	Appreciate the importance of Multiplexing, find out their application areas. The learner must be able to calculate the Noise temperature & SNR for different systems,	Explain	K2
CO5	compare between the performance of the different modulation methods by comparing their SNR. Also Understand the statistical analysis of Communication Sysytem	Classify	K4

Course Title: Analog circuits	**Code: EC402**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**
.CO1	Understand the characteristics of diodes and transistors	Understand	K2
.CO2	Design and analyze various rectifier and amplifier circuits	Discuss	K6
CO3	Design sinusoidal and non-sinusoidal oscillators	Illustrate	K2
CO4	Develop The Instruction level parallelism	Develop	K3
.CO5	Understand the functioning of OP-AMP and design OP-AMP based circuits	Analyze	K4

Course Title: Microprocessor & Microcontroller	**Code: EC403**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**Details**	**Action Verb**	**Knowledge Level**
.CO1	Do assembly language programming	Write	K6

CO2	Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc	Design	K6
.CO3	Develop systems using different microcontrollers	Determine	K5
.CO4	Understand RSIC processors and design ARM microcontroller based systems.	Design	K6

Course Title: Design and Analysis of Algorithms	**Code: ES-CS401**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
.CO1	Analyse the complexities of different algorithms.	Analyze	K4
CO2	Develop the algorithm techniques (example Divide & Conquer, Dynamic Programming etc) to solve different mathematical models.	Develop	K3
. CO3	Illustrate the techniques of Greedy paradigm, Branch and Bound, Backtracking etc and compare and contrast them.	Illustrate	K2
.CO4	Discuss the types of Minimal spanning tree and traversal algorithm with their applications.	Discuss	K6
CO5	Understand the variations among tractable and intractable problems to introduce polynomial and non-polynomial reduction.	Understand	K2
.CO6	Explain the randomized algorithms and approximation algorithms to illustrate their applications.	Explain	K5

Mapping of COs with POs and PSOs (Course Articulation Matrix):

Course Title: Biology	**Code: BS-B401**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 2L+1T/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
.CO1	Describe with examples the biological observations lead to major discoveries	Describe	K1
CO2	Explain the classification of kingdom and building blocks of life, classification at cellular, energy and excretory level, habitat, study of model organisms, explain techniques of biophysics to study biological phenomena, cancer diagnosis and treatment.	Explain	K2
CO3	Identify DNA as genetic material in the molecular basis of information transfer	Identify	K3

CO4	Analyze biological processes at the reductionistic level.	Analyze	K4
.CO5	Apply thermodynamic principles to biological systems.	Apply	K3
CO6	Identify microorganism	Identify	K3

Course Title: Numerical Methods (BS)	**Code: BS-M401**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 1L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	. Approximation in numerical computation: Truncation and rounding errors, Fixed and floating-point arithmetic, Propagation of errors.	Resolve	K3
.CO2	Interpolation: Newton forward/backward interpolation, Lagrange's and Newton's divided difference Interpolation. Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Expression for corresponding error terms	Solve	K3
CO3	Numerical solution of a system of linear equations: Gauss elimination method, Matrix inversion, LU Factorization method, Gauss-Seidel iterative method	Conceive	K2
CO4	Numerical solution of Algebraic equation: Bisection method, Regula-Falsi method, Newton-Raphson method	Acquire	K1
CO5	Numerical solution of ordinary differential equation: Euler's method, Runge-Kutta methods, PredictorCorrector methods and Finite Difference	Determine	K5

SEMESTER – IV

PRACTICAL

Course Title: Analog Communication Lab	**Code: EC491**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Course Coordinator :	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level

.CO1	Measurement of modulation index of an AM signal. 2. Measurement of output power with varying modulation index an AM signal(for both DSB- &.	Discuss	K6
CO2	Measurement of distortion of the demodulated output with varying modulation index of an AM signal (for both DSB-SC & SSB). 4. Measurement of power of different frequency components of a frequency modulated signal & the measurement of the bandwidth	Understand	K2
CO3	Design and set up a PLL using VCO & to measure the lock frequency & Design and set up a FM demodulator using PLL	Analyze	K4
CO4	Measurement of SNR of a RF amplifier & Measurement of selectivity, sensitivity, fidelity of a superheterodyne receiver	Illustrate	K2
.CO5	One innovative experiment.	Explain	K5

Course Title: Analog Electronic Circuits Lab	**Code: EC492**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Course Coordinator :	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Design and test rectifiers, clipping circuits, clamping circuits and voltage regulator	Analyze	K4
CO2	Compute the parameters from the characteristics of JFET and MOSFET devices	Understand	K2
CO3	Design, test and evaluate BJT amplifiers in CE configuration	Examine	K4
CO4	Design and test JFET/MOSFET amplifiers	Discuss	K6
CO5	Design and test a power amplifier	Develop	K3
CO6	: Design and test various types of oscillators	Explain	K2

Course Title: Numerical Methods Lab (BS)	**Code: BS-M491**
Type Of Course: Practical	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L/week**
Continuous Assessment: 40Marks	**Final Exam: 60Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Assignments on numerical integration using Trapezoidal rule, Simpson's 1/3 rule, Weddle's rule. 3. Assignments on numerical solution of a system of linear equations using Gauss elimination and Gauss-Seidel iterations.	Identify	K1
CO2	Assignments on numerical solution of Algebraic Equation by Regular-falsi and Newton Raphson methods. 5. Assignments on ordinary differential equation: Euler's and Runga-Kutta methods	Distinguish	K4
CO3	Introduction to Software Packages: Matlab / Scilab / Labview / Mathematica.	Choose	K3

Course Title: Microprocessor & Microcontroller Lab	**Code: EC493**
Type Of Course: Practical	**Course Designation: Compulsory**
Semester: 4th	**Contact Hours: 3L/week**
Continuous Assessment: 40Marks	**Final Exam: 60Marks**
Writer: Course Coordinator	**credits 1**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Familiarization with 8085 & 8051simulator on PC. 2. Study of prewritten programs using basic instruction set (data transfer, Load/Store, Arithmetic, Logical) on the KIT & Assignments based on above	Identify	K1
CO2	Program using subroutine calls and IN/OUT instructions using 8255 PPI on the trainer kit e.g. subroutine for delay, reading switch state and glowing LEDs accordingly & Study of timing diagram of an instruction on oscilloscope.	Distinguish	K4
CO3	Interfacing of 8255: Keyboard and Multi-digit Display with multiplexing using 8255 & Study of 8051 Micro controller kit and writing programs as mentioned in S/L3. Write programs	Choose	K3
CO4	Serial communication between two trainer kits	Judge	K5

Course Title: Soft Skill Development Lab	**Code: HS – HU 481**
Type Of Course: Practical	**Course Designation: Compulsory**
Semester: 4rth	**Contact Hours: 3L/week**
Continuous Assessment: 40Marks	**Final Exam: 60Marks**

Writer: Course Coordinator	credits 1

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Students will be able to communicate in English confidently	Identify	K1
CO2	Students will be able to communicate appropriately in professional and social situations..	Distinguish	K4
CO3	Students will be able to improve team working ,leadership skills and problem solving skills through group activities like GD, case studies, Role play etc.	Choose	K3
CO4	Students will be able to organize and write properly and correctly business correspondence 5. Students will be able to do active listening	Judge	K5

SEMISTER-V

Course Title: Electromagnetic Waves	**Code: EC501**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 3L / week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Understand characteristics and wave propagation on high frequency transmission lines	Understand	K2
CO2	Carryout impedance transformation on TL	Identify	K3
CO3	Use sections of transmission line sections for realizing circuit elements	Design	K6
CO4	Characterize uniform plane wave	Identify	K3
CO5	Calculate reflection and transmission of waves at media interface	Develop	K3
CO6	Analyze wave propagation on metallic waveguides in modal form &Understand principle of radiation and radiation characteristics of an antenna	Develop	K6

Course Title: Computer Architecture	**Code: EC502**
Type Of Course: Theory	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Demonstrate the concepts of Operating System Services, System calls, structure and types.	Demonstrate	K2
CO2	Discuss processes and threads for multiprogramming and multi-threading.	Discuss	K6
CO3	Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response	Develop	K3
CO4	Explain algorithmic solutions to process synchronization problems for Inter-Process communication	Explain	K5
CO5	Analyse the necessary conditions for Deadlock avoidance and prevention to solve them.	Analyze	K6
CO6	Explain Memory management, Virtual Memory, I/O Hardware, File and Disk Management system.	Explain	K2

Course Title: Digital Communication and Stochastic	**Code: EC503**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	understand the concept of Stochastic Process in Communication System	Describe	K1
CO2	represent various signals in different mathematical forms	Explain	K2
CO3	analyze baseband transmission mode of digital data	Analyze	K4
CO4	analyze different career modulation techniques considering noise aspects	Discuss	K2

Course Title: Digital Signal Processing	**Code: EC504**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Recall the concepts of Accounting and Recognize different systems used in industrial applications.	Recall	K1

CO2	Discuss on the design of appropriate accounting tool required for real life problems.	Discuss	K1
CO3	Apply and demonstrate the use of Economical concepts.	Apply	K3
CO4	Analyze and Simulate a sequential accounting tool for a system or process appropriate for required accuracy.	Analyze	K4
CO5	Design a sequential economic policy that can work according to the required specifications.	Design	K6
CO6	Justify a specific accounting technique for an specific purpose.	Justify	K5

Course Title: Power Electronics	**Code: PE-EC505C**
Type of Course: Theory	**Course Designation: Elective**
Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Build and test circuits using power devices such as SCR	Understand & Design	K2
CO2	Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters	Understand & Analyze	K3
CO3	Learn how to analyze these inverters and some basic applications	Understand & Analyze	K2
CO4	Design SMPS..	Design	K3

Course Title: Soft Skill and Interpersonal Communication	**Code: OE-EC506A**
Type of Course: SESSIONAL	**Course Designation: Elective**
Semester: 5th	**Contact Hours: 3L/week**
Continuous Assessment: 0 Marks	**Final Exam: 100 Marks**
Writer: Course Coordinator	**credits 0**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Understand Basic Structure of the Constitution of India	Understand	K2
CO2	Apply the understanding in Engineering Profession	Apply	K3
CO3	Apply Constitutional Values in Engineering Education	Apply	K3
CO4	Apply Constitutional Provisions in Policy matters of CSE	Apply	K3
CO5	Apply Team Spirit and Constitutional Legislative Provisions for Industrial Design	Apply	K3
CO6	Analyze Constitutional Valuesof Legislation, Executive & Judiciary in the light of the Professional requirements of Computer Science Engineering	Analyze	K4

SEMESTER – V

PRACTICAL

Course Title: Electromagnetic Waves lab	**Code:EC591**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**credits 1**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Understand characteristics and wave propagation on high frequency transmission lines	Understand	K2
CO2	Carryout impedance transformation on TL	Identify	K3
CO3	Use sections of transmission line sections for realizing circuit elements	Design	K6
CO4	Characterize uniform plane wave	Identify	K3
CO5	Calculate reflection and transmission of waves at media interface	Develop	K3
CO6	Analyze wave propagation on metallic waveguides in modal form &Understand principle of radiation and radiation characteristics of an antenna	Develop	K6

Course Title: Digital Communication Laboratory	**Code: EC592**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	understand the concept of Stochastic Process in Communication System	Understand	K2

CO2	represent various signals in different mathematical forms	Demonstrate	K3
CO3	analyze baseband transmission mode of digital data	Develop	K6
CO4	analyze different career modulation techniques considering noise aspects	Determine	K5

Course Title: Digital Signal Processing Laboratory	**Code: EC593**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 5th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Define an object oriented programming language, and associated class libraries and learn how to develop object oriented programs.	Define	K1
CO2	Understand the concepts of class, constructor, data encapsulation, inheritance, overriding and polymorphism to describe large scale software.	Understand	K2
CO3	Develop and debug programs using object oriented principles with wrapper class, arrays.	Develop	K3
CO4	Apply the concept of interfaces- multiple inheritance, extending interfaces.	Apply	K3
CO5	Analyze and use an integrated environment development by creating and accessing packages and multithreaded programming	Analyze	K4
CO6	Develop programs with Graphical User Interfaces capabilities and solve related problems.	Develop	K6

SEMESTER – VI

THEORY

Course Title: Control System and Instrumentation	**Code: EC601**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Characterize a system and find its steady state behavior	Understand	K1
CO2	Investigate stability of a system using different tests	Identify	K3
CO3	Design various controllers	Describe	K5
CO4	Solve linear, non linearand optimal control problems	Evaluate	K2
CO5	Study with CRO, Wave analyzer, Spectrum analyzer knowing their functional details.	Analyze & Understand	K4

Course Title: Computer Networks	**Code: EC602**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Describe the fundamental concepts of computer networking, Data Communications System and learn its components.	Describe	K1
CO2	Explain the concept of function(s) of each layer of the OSI model and learn about TCP/IP.	Explain	K2
CO3	Identify the different types of network topologies, protocols, networking devices and make concepts about their functions within a network.	Identify	K3
CO4	Simplify building the skills of subnetting and routing mechanisms.	Simplify	K4
CO5	Justify the different system component parts of the network	Justify	K5
CO6	Develop an expertise in some specific areas of networking such as the design and learn about maintenance of individual networks	Develop	K6

Course Title: Economics for Engineers	**Code: HS-HU 601**
Type of Course: Theory	**Course Designation: Elective**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Understand the basic principles of microeconomics and macroeconomics, including supply and demand, market structures, and economic policy.	Define	K1
CO2	Apply economic analysis to engineering decision-making, including cost-benefit analysis, project evaluation, and resource allocation.	Design	K6
CO3	Analyze the impact of economic factors on engineering projects and industries, including pricing, competition, and technological change.	Evaluate	K5
CO4	Evaluate the economic implications of engineering innovations, including the potential for job creation, economic growth, and sustainability.	Identify	K3
CO5	Understand the role of government and public policy in shaping the economy and its impact on engineering practices.	Illustrate	K2
CO6	Develop critical thinking skills to identify and analyze economic issues relevant to engineering, and effectively communicate economic concepts and analysis to both technical and non-technical audiences..	Examine	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

SEMESTER – VI

PRACTICAL

Course Title: Computer Networks Lab	**Code: EC692**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 4P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**credits 1**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Describe the Networking cables (CAT5, UTP), Connectors (RJ45, T-connector) and installation of Network Interface Card .	Describe	K1
CO2	Explain the working and difference of various networking devices like Hub, Bridge, Network Switch, Router and Modem.	Explain	K2
CO3	Developed a client server socket programming using TCP and UDP approach in C and Java.	Develop	K3
CO4	Generate techniques Data link Layer Flow control mechanisms like Stop &Wait and Sliding Window using C.	Generate	K4

CO5	Explain how to implement Data Link Layer Error Detection Mechanism (Cyclic Redundancy Check) and error control mechanism like Selective Repeat and GoBack-N algorithm using C.	Explain	K5
CO6	Create the server setup configuration using different process like FTP, DNS, TelNet,NFS and concept of Firewall.	Create	K6

Course Title: Control and Instrumentation Laboratory	Code: EC691
Type of Course: Theory	Course Designation: Elective
Semester: 6th	Contact Hours:
Continuous Assessment: 40	Final Exam: 60 Marks
Writer: Course Coordinator	credits 1

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Students will be able to explain the concepts of feedback control, open-loop control, and closed-loop control.	Explain	K1
CO2	Students will be able to determine the stability, transient response, and steady-state response of control systems.	Analyze	K2
CO3	Students will be able to design and implement controllers using different control techniques such as PID control, cascade control, and feed forward control.	Design and implement	K3
CO4	Students will be able to select appropriate sensors and actuators for a given control system application.	Utilize	K4
CO5	Students will be able to identify and model the dynamics of a given control system.	Perform	K5
CO6	Students will be able to analyze and evaluate the performance of control systems in terms of criteria such as stability, accuracy, and robustness.	Evaluate	K6

Course Title: Mini Project / Electronic Design Workshop	Code: EC681
Type of Course: SESSIONAL	Course Designation: Elective
Semester: 6th	Contact Hours: 3L/week
Continuous Assessment:	Final Exam: 70 Marks
Writer: Course Coordinator	credits 2

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis	Describe	K1
CO2	Design, implement and test the prototype/algorithm in order to solve the conceived problem	Explain	K2

CO3	Write comprehensive report on mini project work.	Analyze	K4

Mapping of COs with POs and PSOs (Course Articulation Matrix):

Course Title: CMOS VLSI Design	**Code: PE-EC603C**
Type of Course: Theory	**Course Designation: Elective**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Understand the basic elements of numerical methods and error analysis.	Understand	K2
CO2	Understand the theoretical aspects of the use of numerical methods.	Understand	K2
CO3	Apply the concepts of numerical methods to design algorithms for automated processing.	Apply	K3
CO4	Evaluate the limitations, advantages, and disadvantages of different numerical methods.	Evaluate	K5
CO5	Evaluate and Apply appropriate numerical method approach for a given problem.	Evaluate	K5
CO6	Implement numerical methods for solving various engineering problems.	Implement	K3

Course Title: Operating System	**Code: OE-EC604B**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 6th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Understand the difference between different types of modern operating systems, virtual machines and their structure of implementation and applications.	Define	K1
CO2	Understand the difference between process & thread, issues of scheduling of user-level processes / threads and their issues & use of locks, semaphores, monitors for synchronizing multiprogramming with multithreaded systems and implement them in multithreaded programs	Explain	K2
CO3	Understand the concepts of deadlock in operating systems and how they can be managed / avoided and implement them in multiprogramming system	Identify	K3
CO4	Understand the design and management concepts along with issues and challenges of main memory, virtual memory and file system	Examine	K4

CO5	Understand the types of I/O management, disk scheduling, protection and security problems faced byoperating systems and how to minimize these problems.	Explain	K2

Course Title: Universal Human Values	**Code: MC681**
Type of Course: SESSIONAL	**Course Designation: Sessional**
Semester: 6th	**Contact Hours: 2P/week**
Continuous Assessment: 00 Marks	**Final Exam: 100 Marks**
Writer: Course Coordinator	Credits 0

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Understand the concept of universal human values	Explain	K
CO2	Analyze the importance of universal human values in society	Analyze	K3
CO3	Apply universal human values in personal and professional life	Apply	K4
CO4	Evaluate ethical dilemmas using universal human values as a framework	Evaluate	K5
CO5	Critically reflect on personal values and their alignment with universal human values	Reflect	K6
CO6	Demonstrate empathy and respect for diverse perspectives and cultures	Demonstrate	K4

SEMESTER – VII

THEORY

Course Title: Principles of Management	**Code:** HS-HU701
Type of Course: Theory	**Course Designation: Elective**
Semester: 7th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Credit- 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	. Basic concepts of management: Definition - Essence, Functions, Roles, Level. 2. Functions of Management: Planning - Concept, Nature, Types, Analysis, Management by objectives; Organisation Structure - Concept, Structure, Principles	Explain	K2
CO2	. Management and Society - Concept, External Environment, CSR, Corporate Governance, Ethical Standards.	Analyze	K4

CO3	. People Management - Overview, Job design, Recruitment & Selection, Training & Development, Stress Management. 5. Managerial Competencies - Communication, Motivation, Team Effectiveness, Conflict Management, Creativity, Entrepreneurshi	Analyze	K4
CO4	Leadership: Concept, Nature, Styles. 7. Decision making: Concept, Nature, Process, Tools & techniques.	Explain	K2
CO5	Customer Management - Market Planning & Research, Marketing Mix, Advertising & Brand Management. 10. Operations & Technology Management - Production & Operations Management, Logistics & Supply Chain Management, TQM, Kaizen & Six Sigma, MIS	Evaluate	K5

Course Title: Microwave Theory and Technique	**Code:** PE-EC701A
Type of Course: Theory	**Course Designation: Elective**
Semester: 7th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	Credits 3

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Understand various microwave system components their properties.	Describe	K1
CO2	Appreciate that during analysis/ synthesis of microwave systems, the different mathematical treatment is required compared to general circuit analysis. Logic.	Explain	K2

Course Title: Embedded System	**Code:** PE-EC703A
Type of Course: Theory	**Course Designation: Elective**
Semester: 7th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	System, Brief introduction to Embedded software in system, Design Process in Embedded	Discuss	K6
.CO2	Serial and Parallel communication Ports, Timer and Counting devices, Watchdog timers, real time clock, Serial bus Communication Protocols- I2C, CAN, and Parallel Communication Protocol	Understand	K2
.CO3	Processor Architectures-ARM, Processor and Memory organization, Parallelism in instruction level,	Illustrate	K2

	Processor and memory selection		
.CO4	language-C, Processor directives, functions and macros and other programming elements, Embedded C++ concept	Analyze	K4
.CO5	Basic Design rule using RTOS, Task scheduling using Priority based scheduling, cyclic scheduling and round robin scheduling.	Develop	K3
.CO6	Asynchronous serial port, SPI mode, I2C mode, Interfacing with LCD, ADC, sensors, stepper motor, key board,	Explain	K5

Course Title: Web Technology	**Code: OE-EC704A**
Type of Course: Theory	**Course Designation: Elective**
Semester: 7th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	design good web pages using different tags, tables, forms, frames and style sheets supported by HTM.	Describe	K1
CO2	. implement, compile, test and run Java programs, comprising more than one class, to address a particular software problem	Identify	K3
CO3	. demonstrate the ability to employ various types of selection statements and iteration statements in a Java program.	Evaluate	K5
.CO4	. be able to leverage the object-oriented features of Java language using abstract class and interface	Understand	K2
.CO5	be able to handle errors in the program using exception handling techniques of Java	Analyze	K4
CO6	design applets as per the requirements with event handling facility.	Explain	K2

Course Title: Digital Image and Video Processing	**Code:** PE-EC702B
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 7th	**Contact Hours: 12P/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Mathematically represent the various types of images and analyze them.	Identify	K3
CO2	Process these images for the enhancement of certain properties or for optimized use of the resource	Understand	K2
CO3	Develop algorithms for image compression and coding	Understand	K2

Course Title: Project Stage I	**Code: EC782**
Type of Course: SESSIONAL	**Course Designation: Compulsory**
Semester: 7th	**Contact Hours:**
Continuous Assessment: 0	**Final Exam: 100**
Writer: Course Coordinator	**credits 4**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	. Survey and study of published literature on the assigned topic;	Examine	K3
CO2	Working out a preliminary Approach to the Problem relating to the assigned topic	Describe	K1
CO3	Conducting preliminary Analysis/Modelling/Simulation/Experiment/Design/Feasibility;	Compare	K4
CO4	Final Seminar, as oral Presentation before a departmental committee	Evaluate	K5
CO5	Describe Special institutions for entrepreneurial development and assistance in India	Describe	K1
CO6	Explain project Identification	Explain	K6

SEMESTER – VIII

THEORY

Course Title: Antennas and Propagation	**Code:** PE-EC801A
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	Understand the properties and various types of antennas.	Describe	K1
CO2	Analyze the properties of different types of antennas and their design.	Evaluate	K5
CO3	Operate antenna design software tools and come key up with the design of the antenna of required specifications.	Illustrate	K2

Course Title: Internet of Things	**Code:** OE-EC803A
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
.CO1	Understand the vision of IoT from a global context.	Understand	K2
CO2	Determine the Market perspective of IoT.	Determine	K5
.CO3	Use of Devices, Gateways and Data Management in IoT.	Use of	K3
CO4	Analysed the use of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.	Analysed	K4
.CO5	Understand the architecture of smart sensor.	Understand	K2
CO6	Build the interfacing among IoT components.	Build	K5

Course Title: Mixed Signal Design	**Code:** PE-EC802A
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Course Coordinator :	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
.CO1	. Understand the practical situations where mixed signal analysis is required	Understand	K2
.CO2	Analyze and handle the inter-conversions between signals	Analyze	K4
.CO3	Design systems involving mixed signals.	Design	K6

Course Title Organizational Behavior	**Code:** OE-EC804C
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours: 3L/week**
Continuous Assessment: 25 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**credits 3**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	know about organisational structure, organizational behavior and personality development.	Analyze	K4
CO2	. learn about motivational techniques and skill required to work in a group and the process of group decision making.	Develop	K3
CO3	. know various leadership styles and the role of leader in achievement of organisational objectiv	Illustrate	K2

Course Title Project Stage II	**Code:** EC881
Type of Course: Theory	**Course Designation: Elective**
Semester: 8th	**Contact Hours:**
Continuous Assessment: 0	**Final Exam: 100**
Writer: Course Coordinator	**credits 7.5**

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	Details	Action Verb	Knowledge Level
CO1	. In depth study of the topic assigned in the light of the Report prepared under EC P1; 2. Review and finalization of the Approach to the Problem relating to the assigned top	Describe	K1
CO2	. Preparing an Action Plan for conducting the investigation, including team work; 4. Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed models and E-strategies for	Explain	K2
CO3	Preparing a paper for Conference presentation/Publication in Journals, if possible;	Understand	K2
CO4	. Final Seminar Presentation before a Departmental Committee.	Analyze	K4