Program Name: MECH Faculty Name: Munira Begam/T. Santhi Sree

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	ENGLISH-I	R1611031	18/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
75 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

- To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

Course Outcomes:

1.Summarize how self-introspection brings harmony and satisfaction.

2.Develop scientific attitude to solve many problems which we find difficult to tackle.
3.Analyze clearly and logically and write clearly and logically.
4.Agree that all men can come together and avert the peril.
5.Outline the formation of the planet and realize our place in the universe.
6.Develop humor and the use of words for irony.

SYLLABUS:

UNIT I:

1. 'Human Resources' from English for Engineers and Technologists.

UNIT 2:

1. ' Transport: Problems and Solutions' from English for Engineers and Technologists.

UNIT 3:

1. 'Evaluating Technology' from English for Engineers and Technologists.

UNIT 4:

1. 'Alternative Sources of Energy' from English for Engineers and Technologists.

UNIT 5:

1. 'Our Living Environment' from English for Engineers and Technologists.

UNIT 6:

1. ' Safety and Training' from English for Engineers and Technologists.

Program Name: MECH Faculty Name: D.RATNA BABU/SK AREEF

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	**MATHEMATICS-I**	R1611032	18/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
78 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

- To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

Course Outcomes:

1.Classify differential equations by order linearity and homogeneity.
2.Solve linear equations with constant coefficients.
3.solve differential equations using Laplace transforms and inverses Laplace transforms.
4.Estimate the Maximum and Minimum of the function of two variables
5.Solve linear partial differential equations of both first and second order
6.solve linear second order PDEs by separation of variables, with applications to the wave, diffusion and Laplace's equations

SYLLABUS:

UNIT I: Differential equations of first order and first degree:

Linear-Bernoulli-Exact-Reducible to exact. Applications: Newton's Law of cooling-Law of natural growth and decay-Orthogonal trajectories- Electrical circuits- Chemical reactions.

UNIT II: Linear differential equations of higher order:

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e^{ax}, sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x)- Method of Variation of parameters.

Applications: LCR circuit, Simple Harmonic motion.

UNIT III: Laplace transforms:

Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT IV: Partial differentiation:

Introduction- Homogeneous function-Euler's theorem-Total derivative-Chain rule-Generalized Mean value theorem for single variable (without proof)-Taylor's and Mc Laurent's series expansion of functions of two variables– Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

UNIT V: First order Partial differential equations:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

UNIT VI: Higher order Partial differential equations:

Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type e^{ax+by}, $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$. Classification of second order partial differential equations.

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.

2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India

2. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn

3. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press

4. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.

5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.

6. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

Program Name: MECH Faculty Name: G.ANURADHA/.S.SRAVYA

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	**ENGINEERING CHEMISTRY**	R1611033	18/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
72 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

- To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

Course Outcomes:

1.Appraise the quality and utility of suitable water for industrial as well as domestic

applications.
2.Extrapolate the knowledge of cell, electrode, cathode, anode, electrolysis, electromotive force, reference electrode and batteries in chemical and other engineering areas.
3.Identify and evaluate different factors influencing corrosion and protection methods
4.Substantiate the utility of polymers in chemical and hardware industries. Inculcate knowledge of basic construction materials with its vital role.
5.Extrapolate the application of fuels in day to day life and to understand energy–related problems and solve them.
6.Explore the engineering applications of polymeric materials, cement, nano materials, liquid crystals, pv cells etc and Familiar with principle application of green chemistry and green synthesis

SYLLABUS:

UNIT I: HIGH POLYMERS AND PLASTICS

Polymerisation:- Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties – ***Plastics*** as engineering materials : advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4/5 techniques)- Preparation, properties and applications of polyethene, PVC, Bakelite Teflon and Polycarbonates ***Elastomers :-*** Natural rubber- compounding and vulcanization – Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers.

Composite materials & Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

UNIT II: FUEL TECHNOLOGY

Fuels – Introduction – Classification – Calorific value - HCV and LCV – Dulong's formula – Bomb calorimeter – Numerical problems – Coal — Proximate and ultimate analysis – Significance of the analyses – Liquid fuels – Petroleum- Refining – Cracking – Synthetic petrol –Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knock agents – Power alcohol – Bio-diesel – Gaseous fuels – Natural gas, LPG and CNG – Combustion – Calculation of air for the combustion of a fuel – Flue gas analysis – Orsat apparatus – Numerical problems on combustion. ***Explosives:-*** Rocket fuels.

UNIT III: ELECTROCHEMICAL CELLS AND CORROSION

Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc – air cells. ***Corrosion :-*** Definition – Theories of Corrosion (chemical & electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion –

Design and material selection – Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating).

UNIT IV: CHEMISTRY OF ADVANCED MATERIALS

Nano materials:- Introduction – Sol-gel method & chemical reduction method of preparation – Characterization by BET method and TEM methods - Carbon nano tubes and fullerenes: Types, preparation, properties and applications ***Liquid crystals:-*** Introduction – Types – Applications ***Super conductors:-***Type – I, Type II – Characteristics and applications

Green synthesis:- Principles - 3or 4 methods of synthesis with examples – R_4M_4 principles

UNIT V: WATER TECHNOLOGY

Hard water:- Reasons for hardness – units of hardness - determination of hardness and alkalinity - Water for steam generation - Boiler troubles – Priming and Foaming, Scale formation, Boiler corrosion, Caustic embrittlement - Internal treatments - Softening of Hard water : Lime – Soda process, Zeolite process and numerical problems based on these processes and Ion Exchange process - Water for drinking purposes- Purification – Sterilization and disinfection : Chlorination, Break point chlorination and other methods – Reverse Osmosis and Electro Dialysis.

UNIT VI: CHEMISTRY OF ENGINEERING MATERIALS AND FUEL CELLS

Refractories: - Definition, characteristics, classification, properties, failure of refractories

Lubricants: - Definition, function, Theory and mechanism of lubricants, properties (Definition and importance) ***Cement: -*** Constituents, manufacturing, hardening and setting, deterioration of cement ***Insulators: -*** Thermal and electrical insulators ***Fuel cells: -*** Hydrogen Oxygen fuel cells – Methanol Oxygen fuel cells **Outcome:** The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion.

and some methods of corrosion control would be understood. The students would be now aware of materials like nano materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. The impurities present in raw water, problems associated with them and how to avoid them are understood. The advantages and limitations of plastic materials and their use in design would be understood. The commonly used industrial materials are introduced.

Standard Books:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

Reference Books:

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).

2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.

3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition

4. Applied Chemistry by H.D. Gesser, Springer Publishers

5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

Program Name: MECH Faculty Name: N.V.MALAVIKA/V.CHANDRIKA

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	**ENIGINEERING MECHANICS**	R1611032	18/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
75 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

PO1.**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

- To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

Course Outcomes:

1.Determine resultants of different force systems.
2.Apply conditions of static equilibrium to plane force systems
3.Determine centroid and center of gravity of composite bodies
4.Determine Moment of inertia and Mass moment of inertia of composite bodies
5.Solve problems in kinematic and dynamic systems
6.Calculate work, energy for different systems.

SYLLABUS:

UNIT – I

Introduction to Engg. Mechanics – Basic Concepts. **Systems of Forces:** Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. **Friction:** Introduction**,** limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction

UNIT II

Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorem, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium, analysis of plane trusses.

UNIT – III

Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures

Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems.

UNIT IV

Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia:** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V

Kinematics: Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

UNIT – VI

Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

TEXT BOOKS :

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications.

REFERENCES :

1. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11th Edn – Pearson Publ.
2. Engineering Mechanics, statics – J.L.Meriam, 6th Edn – Wiley India Pvt Ltd.
3. Engineering Mechanics, statics and dynamics – I.H.Shames, – Pearson Publ.
4. Mechanics For Engineers, statics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
5. Mechanics For Engineers, dynamics - F.P.Beer & E.R.Johnston –5th Edn Mc Graw Hill Publ.
6. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best & W.G. McLean, 5th Edn – Schaum's outline series - Mc Graw Hill Publ.
7. Singer's Engineering Mechanics: Statics And Dynamics, K. Vijay Kumar Reddy, J. Suresh Kumar, Bs Publications
8. Engineering Mechanics, Fedinand . L. Singer, Harper – Collins.
9. Engineering Mechanics statics and dynamics , A Nelson , Mc Graw Hill publications

Program Name: MECH Faculty Name: O.SRAVANI/M.UDAYA TEJASWINI

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	**COMPUTER PROGRAMMING**	R1611032	18/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
68 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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.

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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.

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Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

- To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

Course Outcomes:

1.Design algorithms using fundamentals concepts of computer system Using different data types, operators and standard library functions.
2.Design applications involving the control flow statements
3.Design a case study involving modular programming
4.Design application involving arrays and strings
5.Design applications using structures, unions, pointers .
6.Design applications using file system concepts.

1.

SYLLABUS:

UNIT-I:

History and Hardware - Computer Hardware, Bits and Bytes, Components, Programming Languages – Machine Language, Assembly Language, Low- and High-Level Languages, Procedural and Object-Oriented Languages, Application and System Software, The Development of C Algorithms The Software Development Process.

UNIT-II:

Introduction to C Programming- Identifiers, The main () Function, The printf () Function

Programming Style - Indentation, Comments, Data Types**,** Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization.

Assignment - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

UNIT -III:

Control Flow-Relational Expressions - Logical Operators:

Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.

Repetition: Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, The while Statement, The for Statement, Nested Loops, The do-while Statement.

UNIT-IV

Modular Programming: Function and Parameter Declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Storing Addresses, Using Addresses, Declaring and Using Pointers, Passing Addresses to a Function. Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

UNIT-V:

Arrays & Strings

Arrays: One-DimensionalArrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, LargerDimensionalArrays- Matrices

Strings: String Fundamentals, String Input and Output, String Processing, Library Functions

UNIT-VI:

Pointers, Structures, Files

Pointers: Concept of a Pointer, Initialization of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.

Structures: Derived types, Sstructures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.

Data Files: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

Text Books:

1. ANSI C Programming, Gary J. Bronson, Cengage Learning.
2. Programming in C, Bl Juneja Anita Seth, Cengage Learning.
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

Reference Books:

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. Programming with C, Bichkar, Universities Press.
3. Programming in C, ReemaThareja, OXFORD.
4. C by Example, Noel Kalicharan, Cambridge.

Program Name: MECH Faculty Name: K.SURYA KUMARI

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	**ENVIRONMENTAL STUDIES**	R1611032	18/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
68 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

- To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

Course Outcomes:

1.Classify various environmental challenges induced due to unplanned anthropogenic activities.

2.To provide basic knowledge on ecosystems; its diversity and protection methods. Role of food webs and food chains in an ecosystem.
3.Illustrate natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
4.Illustrate the biodiversity of India and the threats to biodiversity and conservation practices to protect the biodiversity
5.Explain the role of individual in minimizing pollution and management of wastes.
6.Explain the knowledge of environmental legislation and urban related problems
7.Explain the knowledge of environmental management and green concepts.

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SYLLABUS:

UNIT – I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, Carbon Credits, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

ENVIRONMENTAL STUDIES

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT – II Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Literate, Coal, Sea and River sands.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy

sources Vs Oil and Natural Gas Extraction. Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources

for sustainable lifestyles.

UNIT – III Biodiversity and its conservation: Definition: genetic, species and ecosystem diversityclassification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, manwildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT – IV Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being. **Solid Waste Management:** Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT – V Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT – VI Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics. The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

TEXT BOOKS:

1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada

2. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.

3.Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCE:

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.

2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi

3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi

4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014

Program Name: ME-A&B Faculty Name: MUNIRA BEGUM/T.SANTHI SREE

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	**ENGLISH COMMUNICATION SKILLS LAB-I**	RT21038	18/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
36 Hours	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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.

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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.

Programme Specific Outcomes:

PSO1. Specify, architect, design and analyze systems that efficiently generate, transmit, distribute and utilize electrical power.

PSO2. Analyze and design modern electrical drive systems and modern lighting systems.

PSO3. Understand the principles and construction of electrical machines and determine their performance through testing.

PSO4. Specify, design, implement and test analog and embedded signal processing electronic systems using the state of the art components and software tools.

Course Objectives:

Course Objective: To impart practical exposure on the microstructures of various materials and their hardness evaluation. Also to impart practical knowledge on the evaluation of material properties through various destructive testing procedures.

Course Outcomes:

1.Relate himself with G.D.Naidu to become successful entrepreneurs.
2.How grit and determination can take a common man to heights
3.Apply interest in multiple fields of knowledge and social service to make life worthy.
Invent new things by emulating Vijay Bhatkar.

SYLLABUS:

UNIT 1:

1. WHY study Spoken English?

2. Making Inqueries on the phone, thanking and responding to Thanks

Practice work.

UNIT 2:

1. Responding to Requests and asking for Directions, Practice work.

UNIT 3:

1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating

2. Apologising, Advising, Suggesting, Agreeing and Disagreeing

Practice work.

UNIT 4:

1. Letters and Sounds, Practice work.

UNIT 5:

1. The Sounds of English, Practice work.

UNIT 6:

1. Pronunciation

2. Stress and Intonation

Practice work.

Program Name: ME-A&B Faculty Name: G.ANURADHA/.S.SRAVYA

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	**ENGINEERING/ APPLIED CHEMISTRY LAB**	RT21038	18/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
36 Hours	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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.

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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.

Programme Specific Outcomes:

PSO1. Specify, architect, design and analyze systems that efficiently generate, transmit, distribute and utilize electrical power.

PSO2. Analyze and design modern electrical drive systems and modern lighting systems.

PSO3. Understand the principles and construction of electrical machines and determine their performance through testing.

PSO4. Specify, design, implement and test analog and embedded signal processing electronic systems using the state of the art components and software tools.

Course Objectives:

Course Objective: To impart practical exposure on the microstructures of various materials and their hardness evaluation. Also to impart practical knowledge on the evaluation of material properties through various destructive testing procedures.

Course Outcomes:

1.Develop knowledge on analysis with basic concepts of morality, normality, morality, mole fractions
2.Determine the quality of food and water using neutralization titration
3.Appraise the quality of a product or water using complex metric titration.
4.Determine the quantity of ions in the sample using precipitation titration.
5.Analyze pH of the given samples.
6.Estimate quality of food and water based on conductivity and potential samples

LIST OF EXPERIMENTS:

1. Introduction to Chemistry laboratory – Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.
2. Trial experiment - Determination of HCl using standard Na_2CO_3 solution.
3. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH.
4. Determination of $KMnO_4$ using standard Oxalic acid solution.
5. Determination of Ferrous iron using standard $K_2Cr_2O_7$ solution.
6. Determination of Copper using standard $K_2Cr_2O_7$ solution.
7. Determination of temporary and permanent hardness of water using standard EDTA solution.
8. Determination of Copper using standard EDTA solution.
9. Determination of Iron by a Colorimetric method using thiocynate as reagent.
10. Determination of pH of the given sample solution using pH meter.
11. Conductometric titration between strong acid and strong base.
12. Conductometric titration between strong acid and weak base.
13. Potentiometric titration between strong acid and strong base.
14. Potentiometric titration between strong acid and weak base.
15. Determination of Zinc using standard EDTA solution.
16. Determination of Vitamin – C.

Reference Books

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Dr. Jyotsna Cherukuris (2012) *Laboratory Manual of engineering chemistry-II,* VGS Techno Series
3. Chemistry Practical Manual, Lorven Publications
4. K. Mukkanti (2009) *Practical Engineering Chemistry,* B.S. Publication

Program Name: ME-A&B Faculty Name: B.RAJESH KUMAR/ M.UDAYA TEJASWINI

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	**C-PROGRAMMING LAB**	RT21038	18/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
36 Hours	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

PO1.**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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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.

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Programme Specific Outcomes:

PSO1. Specify, architect, design and analyze systems that efficiently generate, transmit, distribute and utilize electrical power.

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PSO3. Understand the principles and construction of electrical machines and determine their performance through testing.

PSO4. Specify, design, implement and test analog and embedded signal processing electronic systems using the state of the art components and software tools.

Course Objectives:

Course Objective: To impart practical exposure on the microstructures of various materials and their hardness evaluation. Also to impart practical knowledge on the evaluation of material properties through various destructive testing procedures.

Course Outcomes:

1.Design algorithms using fundamental concepts of computer system
2.Construct programs in C language Using different data types ,operators and standard library functions
3.Design applications involving the control flow statements.
4.Design a case study involving modular programming
5.Design application involving arrays and strings
6.Design applications using structures, unions, pointers and file system concepts.

LIST OF EXPERIMENTS:

Programming :

Exercise - 1 Basics

a) What is an OS Command, Familiarization of Editors - vi, Emacs

b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man

c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

Exercise - 2 Basic Math

a) Write a C Program to Simulate 3 Laws at Motion

b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise - 3 Control Flow - I

a)Write a C Program to Find Whether the Given Year is a Leap Year or not.

b)Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II

a)Write a C Program to Find Whether the Given Number is

i) Prime Number

ii) Armstrong Number

b) Write a C program to print Floyd Triangle

c) Write a C Program to print Pascal Triangle

Exercise – 5 Functions

a) Write a C Program demonstrating of parameter passing in Functions and returning values.

b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

Exercise – 6 Control Flow - III

a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case

b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

Exercise – 7 Functions – Continued Write a C Program to compute the values ofsin x and cos x and e^x values using Series expansion. (use factorial function)

Exercise – 8 Arrays:Demonstration of arrays

a) Search-Linear.

b) Sorting-Bubble, Selection.

c) Operations on Matrix.

Exercises - 9 Structures

a)Write a C Program to Store Information of a Movie Using Structure

b)Write a C Program to Store Information Using Structures with Dynamically Memory Allocation

c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

Exercise - 10 Arrays and Pointers

a)Write a C Program to Access Elements of an Array Using Pointer

b) Write a C Program to find the sum of numbers with arrays and pointers.

Exercise – 11 Dynamic Memory Allocations

a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.

b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function. Understand the difference between the above two programs

Exercise – 12 Strings:

a) Implementation of string manipulation operations **with** library function.

i) copy

ii) concatenate

iii) length

iv) compare

b) Implementation of string manipulation operations **without** library function.

i) copy

ii) concatenate

iii) length

iv) compare**Exercise -13** Files

a)Write a C programming code to open a file and to print it contents on screen.

b)Write a C program to copy files

Exercise - 14 Files Continued

a) Write a C program merges two files and stores their contents in another file.

b)Write a C program to delete a file.

Program Name: MECH Faculty Name: Munira Begam

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	ENGLISH-II	R1612031	18/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
75 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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.

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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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

❖ To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

Course Outcomes:

1.Interpret that technology should help solve the problems of common man.
2.Summarize that climate must be preserved.
3.Apply emerging technologies such as nanotechnology for the betterment of human life.
4.Outline that water is the elixir of life and try to conserve it.
5.Develop the attitude of devotion and dedication to hard work to succeed in life.
6.Solve personal problems and prioritize national problems.

1. .

SYLLABUS:

UNIT 1:

1. ' The Greatest Resource- Education' from English Encounters

UNIT 2:

1. 1. ' A Dilemma' from English Encounters

UNIT 3:

1. 1. 'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.

UNIT 4:

1. 1. 'The Lottery' from English Encounters.

UNIT 5:

1. 1. ' The Health Threats of Climate Change' from English Encounters.

UNIT 6:

1. 1. ' The Chief Software Architect' from English Encounters

Program Name: MECH Faculty Name: SD.PARVEEN

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	MATHEAMTICS-II	R1612032	18/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
78 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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.

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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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

- To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

Course Outcomes:

1.Solve algebraic or transcendental equation in a simple manner
2.Construct new data points within the range of a discrete set of known data points.
3.Solve differential equations by numerically.
4.Decompose any periodic function or periodic signal into the sum of a (possibly infinite) set of simple oscillating functions, namely sine's and cosines (or complex exponentials)
5.Decompose a function of time (a signal) into the frequencies that make it up
6.To solve the difference equations.

SYLLABUS:

UNIT I: Solution of Algebraic and Transcendental Equations:
Introduction- Bisection method – Method of false position – Iteration method – Newton-Raphson method (One
variable and simultaneous Equations).
UNIT II: Interpolation:
Introduction- Errors in polynomial interpolation – Finite differences- Forward differences- Backward differences
–Central differences – Symbolic relations and separation of symbols - Differences of a polynomial-Newton's
formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.
UNIT III: Numerical Integration and solution of Ordinary Differential equations:
Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series-
Picard's method of successive approximations-Euler's method - Runge-Kutta method (second and fourth order).
UNIT IV: Fourier Series:
Introduction- Periodic functions – Fourier series of -periodic function - Dirichlet's conditions – Even and odd
functions –Change of interval– Half-range sine and cosine series.
UNIT V: Applications of PDE:
Method of separation of Variables- Solution of One dimensional Wave, Heat and two-dimensional Laplace equation.
UNIT VI: Fourier Transforms:
Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

Text Books:
1. B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.
Reference Books:
1. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
2. V.Ravindranath and P.Vijayalakshmi, Mathematical Methods, Himalaya Publishing House.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India
4. David Kincaid, Ward Cheney, Numerical Analysis-Mathematics of Scientific Computing, 3rd Edition, Universities Press.
5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
6. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

Program Name: MECH Faculty Name: SK.AREEF

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	MATHEAMTICS-III	R1612033	18/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
72 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

- To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

Course Outcomes:

1.Acquire knowledge about rank, solve the system of linear equations and apply to electric

circuits
2.The properties of Eigen values and Eigen vectors & apply in free vibration of a two-mass system. Acquire knowledge about Cayley-Hamilton theorem & its applications, quadratic forms and reduction to normal forms
3.Evaluate double and triple integrals to find area, volume, mass and moment of inertia of plane and solid region. Acquire knowledge about application of integral to lengths, volumes and surface areas of revolution
4.Acquire knowledge about Gamma and Beta function and to evaluate improper integrals by using Beta & Gamma
5.Acquire knowledge of gradient, divergence, curl and the various applications of it
6.Acquire knowledge about line, surface & volume integrals and apply to find work done and understand the vector integral theorems by related problems.

SYLLABUS:

UNIT I: Linear systems of equations:
Rank-Echelon form-Normal form – Solution of linear systems – Gauss elimination - Gauss Jordon- Gauss Jacobi
and Gauss Seidal methods. Applications: Finding the current in electrical circuits.
UNIT II: Eigen values - Eigen vectors and Quadratic forms:
Eigen values - Eigen vectors– Properties – Cayley-Hamilton theorem - Inverse and powers of a matrix by using
Cayley-Hamilton theorem- Diagonalization- Quadratic forms- Reduction of quadratic form to canonical form –
Rank - Positive, negative and semi definite - Index – Signature.
Applications: Free vibration of a two-mass system.
UNIT III: Multiple integrals:
Curve tracing: Cartesian, Polar and Parametric forms.
Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration.
Applications: Finding Areas and Volumes.
UNIT IV: Special functions:
Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper
integrals.
Applications: Evaluation of integrals.**UNIT V: Vector Differentiation:**

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.
Applications: Equation of continuity, potential surfaces
UNIT VI: Vector Integration:
Line integral – Work done – Potential function – Area- Surface and volume integrals Vector integral theorems:
Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.
Applications: Work done, Force.
Text Books:
1. **B.S.Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
Reference Books:
1. **Greenberg,** Advanced Engineering Mathematics, 2nd edition, Pearson edn
2. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India
3. **Peter O'Neil,** Advanced Engineering Mathematics,7th edition, Cengage Learning.
4. **D.W. Jordan and T.Smith,** Mathematical Techniques, Oxford University Press.
5. **Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
6. **Dass H.K., Rajnish Verma. Er.,** Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi

Program Name: MECH Faculty Name: A.BINDU MADHAVI

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	ENGINNERING PHYSICS	R1612034	18/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
75 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

- To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

Course Outcomes:

1.Classify and explain the concepts of principles of superposition, Interference, Diffraction and polarization
2.Explain the concepts of production of lasers, wave propagation in optical fibers, structures of crystals and XRD technique
3.Analyze properties of Magnetic, Dielectric, Super conductivity and applications of the devices in different fields in engineering
4.List out the Absorption coefficients of materials and explain the Fundamental laws of electromagnetism and Maxwell's Electromagnetic
5.Explain the properties and theories of matter waves in Quantum levels and Classify the materials into conductors, semi – conductors & insulators
6.Explain the properties of semiconductors and Mechanisms of LEDs, Photo conductors and solar cells by minimizing the environmental pollution.

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SYLLABUS:

UNIT-I

INTERFERENCE: Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings – construction and basic principle of Interferometers.

UNIT-II

DIFFRACTION: Fraunhofer diffraction at single slit cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscopes.

UNIT-III

POLARIZATION: Types of Polarization-production - Nicol Prism -Quarter wave plate and Half Wave plate –
Working principle of Polarimeter (Sacharimeter)

LASERS: Characteristics– Stimulated emission – Einstein's Transition Probabilities- Pumping schemes - Ruby
laser – Helium Neon laser.

UNIT-IV

ACOUSTICS: Reverberation time - Sabine's formula – Acoustics of concert-hall.

ULTRASONICS: Production - Ultrasonic transducers- Non-Destructive Testing –Applications.

UNIT-V

CRYSTALLOGRAPHY & X-RAY DIFFRACTION: Basis and lattice – Bravais systems- Symmetry elements- Unit cell- packing fraction – coordination number- Miller indices – Separation between successive (h
k l) planes – Bragg's law.

NUCLEAR ENERGY – SOURCE OF POWER: Mass defect & Binding Energy – Fusion and Fission as sources – Fast breeder Reactors.

UNIT-VI

MAGNETISM: Classification based on Field, Temperature and order/disorder –atomic origin – Ferromagnetism- Hysteresis- applications of magnetic materials (Para &Ferro)..

DIELECTRICS: Electric Polarization – Dielectrics in DC and AC fields – Internal field – Clausius Mossoti Equation - Loss, Breakdown and strength of dielectric materials – Ferroelectric Hysteresis and applications.

Text Books:

1. A Text book of Engineering Physics – by Dr. M.N.Avadhanulu and Dr.P.G.Kshirasagar, S.Chand & Company
Ltd., (2014)
2. Physics for Engineers by M.R.Srinasan, New Age international publishers (2009)
3. Engineering Physics by D.K.Bhattacharya and Poonam Tandon , Oxford press (2015)

Reference books:

1. Applied Physics by P.K.Palanisamy , Scitech publications (2014)
2. Lasers and Non-Linear optics by B.B.Laud , Newage international publishers (2008)

Program Name: MECH Faculty Name: K.LAKSHMI GANESH

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	BASIC ELECTRONICS AND ELECTRICAL ENGINEERING	R1612035	18/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
68 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

❖ To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

Course Outcomes:

1.Remembre the basic principles of electrical circuital law's and analyze of networks.
2.Understand the principle of operation and construction details of DC machines and Transformers
3.Understand the principle of operation and construction details of Transformers and O.C and S.C Test on Transformer
4.Understand the principle of operation and construction details of Alternator, Three-Phase Induction motors and three-phase synchronous motors
5.Analyze the operation of PN junction diode, half wave, full wave rectifiers and OP-AMPs.
6.Classify the operation of PNP and NPN Transistors and various amplifiers.

SYLLABUS:

UNIT - I
Electrical Circuits:
Basic definitions - Types of network elements - Ohm's Law - Kirchhoff's Laws - Inductive networks - Capacitive networks – Series - Parallel circuits - Star-delta and delta-star transformations.
UNIT - II
Dc Machines:
Principle of operation of DC generator – EMF equation - Types of DC machine – Torque equation – Applications
– Three point starter - Speed control methods of DC motor – Swinburne's Test.
UNIT - III
Transformers:
Principle of operation and construction of single phase transformers – EMF equation – Losses – OC & SC tests -
Efficiency and regulation.
UNIT - IV
AC Rotating Machines:
Principle of operation and construction of alternators– Types of alternators – Principle of operation of synchronous motor - Principle of operation of 3-Phase induction motor – Slip-torque characteristics - Efficiency –
Applications.

UNIT V
Rectifiers & Linear ICs:
PN junction diodes - Diode applications(Half wave and bridge rectifiers). Characteristics of operation amplifiers
(OP-AMP) - application of OP-AMPs (inverting, non-inverting, integrator and differentiator).
UNIT VI
Transistors:

PNP and NPN junction transistor, transistor as an amplifier- Transistor amplifier - Frequency response of CE
amplifier - Concepts of feedback amplifier.

Learning Outcomes:

 Able to analyse the various electrical networks.
 Able to understand the operation of DC generators,3-point starter and DC machine testing by Swinburne's Test.
 Able to analyse the performance of single-phase transformer.
 Able to explain the operation of 3-phase alternator and 3-phase induction motors.
 Able to analyse the operation of half wave, full wave bridge rectifiers and OP-AMPs.
 Able to explain the single stage CE amplifier and concept of feedback amplifier.

Text Books:

1. Electrical Technology by Surinder Pal Bali, Pearson Publications.
2. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.

Reference Books:

1.Electrical Circuit Theory and Technology by John Bird, Routledge Taylor &Francis Group
2. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah,TMH Publications
3.Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications,2nd edition
4.Basic Electrical Engineering by Nagsarkar,Sukhija, Oxford Publications,2nd edition
5.Industrial Electronics by G.K. Mittal, PHI

Program Name: MECH Faculty Name: Dr.P.S.SRINIVAS

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	ENGINNERING DRAWING	R1612036	18/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
68 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, and need for sustainable development.

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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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

❖ To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

Course Outcomes:

1.Remembre the basic principles of electrical circuital law's and analyze of networks.
2.Understand the principle of operation and construction details of DC machines and Transformers
3.Understand the principle of operation and construction details of Transformers and O.C and S.C Test on Transformer
4.Understand the principle of operation and construction details of Alternator, Three-Phase Induction motors and three-phase synchronous motors
5.Analyze the operation of PN junction diode, half wave, full wave rectifiers and OP-AMPs.
6.Classify the operation of PNP and NPN Transistors and various amplifiers.

SYLLABUS:

UNIT – I

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.
Curves: Parabola, Ellipse and Hyperbola by general methods, cycloids, involutes, tangents & normals for the curves.

UNIT – II

Scales: Plain scales, diagonal scales and vernier scales
Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either to of the reference planes (HP,VP or PP)

UNIT – III

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT

UNIT – IV

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT – V

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT – VI

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

REFERENCE BOOKS:

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers
4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age

Program Name: ME-A&B Faculty Name: MUNIRA BEGUM/T.SANTHI SREE

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	ENGLISH COMMUNICATION SKILLS LAB-II	R1612037	18/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
36 Hours	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1. Specify, architect, design and analyze systems that efficiently generate, transmit, distribute and utilize electrical power.

PSO2. Analyze and design modern electrical drive systems and modern lighting systems.

PSO3. Understand the principles and construction of electrical machines and determine their performance through testing.PSO4. Specify, design, implement and test analog and embedded signal processing electronic systems using the state of the art components and software tools.

Course Objectives:

Course Objective: To impart practical exposure on the microstructures of various materials and their hardness evaluation. Also to impart practical knowledge on the evaluation of material properties through various destructive testing procedures.

Course Outcomes:

1.Infer different components of non-verbal communication.
2.Develop communication skills including soft skills.
3.Infer how to participate in GDs and interviews.
Improve Presentation skills.

SYLLABUS:

UNIT 1:

1. Debating

Practice work

UNIT 2:

1. Group Discussions

Practice work

UNIT 3:

1. Presentation Skills

Practice work

UNIT 4:

1. Interview Skills

Practice work

UNIT 5:

1. Email,

2. Curriculum Vitae

Practice work

UNIT 6:

1. Idiomatic Expressions

2. Common Errors in English

Practice work

Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.

2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.

3. Unlock, Listening and speaking skills 2, Cambridge University Press

4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education

Program Name: ME-A&B

Faculty Name: A.BINDU MADHAVI / T.LAKSHMI DEVI / N.V.MALAVIKA

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	ENGINEERING PHYSICS LAB	R1612038	18/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
36 Hours	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1. Specify, architect, design and analyze systems that efficiently generate, transmit, distribute and utilize electrical power.

PSO2. Analyze and design modern electrical drive systems and modern lighting systems.

PSO3. Understand the principles and construction of electrical machines and determine their performance through testing.

PSO4. Specify, design, implement and test analog and embedded signal processing electronic systems using the state of the art components and software tools.

Course Objectives:

Course Objective: To impart practical exposure on the microstructures of various materials and their hardness evaluation. Also to impart practical knowledge on the evaluation of material properties through various destructive testing procedures.

Course Outcomes:

1.Illustrate the concepts of principles of superposition, Interference and Diffraction.
2.Explain the concepts of finding acceleration due to gravity, radius of gyration and rigidity modulus, velocity of sound in air.
3.Compare the characteristics of electronic devices P-N semiconductor diode & Zener diode and applications of the devices in different fields in engineering.
4.Find the experimental values and compare with their standard values.
5.Extend the results to recent developments.
6.Examine the basics of physics in engineering field.

LIST OF EXPERIMENTS:

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano - Convex Lens.
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of vibrations in stretched strings – Sonometer.
8. Determination of velocity of sound – Volume Resonator.
9. L- C- R Series Resonance Circuit.
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
12. Characteristics of Thermistor – Temperature Coefficients.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor p - n junction.
15. Hall Effect in semiconductors.
16. Time constant of CR circuit.
17. Determination of wavelength of laser source using diffraction grating.
18. Determination of Young's modulus by method of single cantilever oscillations.
19. Determination of lattice constant – lattice dimensions kit.
20. Determination of Planck's constant using photocell.
21. Determination of surface tension of liquid by capillary rise method.

Program Name: ME-A&B Faculty Name: B.RAJESH

Class	Semester	Title of The Paper	Paper Code	W.E.F
I	I	EWS/ITWORK SHOP	R1612039	18/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
36 Hours	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1. Specify, architect, design and analyze systems that efficiently generate, transmit, distribute and utilize electrical power.

PSO2. Analyze and design modern electrical drive systems and modern lighting systems.

PSO3. Understand the principles and construction of electrical machines and determine their performance through testing.

PSO4. Specify, design, implement and test analog and embedded signal processing electronic systems using the state of the art components and software tools.

Course Objectives:

Course Objective: To impart practical exposure on the microstructures of various materials and their hardness evaluation. Also to impart practical knowledge on the evaluation of material properties through various destructive testing procedures.

Course Outcomes:

1.Prepare the simple jobs as per specification using carpentry tools.
2.Prepare the simple jobs as per specification using fitting tools.
Prepare the simple jobs as per specification using tin smithy tools.
3.Make simple connections as per specifications given.
4.Infer different types of hardware devices, operating systems and software tools through practical exposure.
5.Illustrate various tables using word and excel and develop different types of charts by analyzing the data given in the tables.

LIST OF EXPERIMENTS:

ENGINEERING WORKSHOP

Trade:

Carpentry 1. T-Lap Joint

2. Cross Lap Joint

3. Dovetail Joint

4. Mortise and Tenon Joint

Fitting 1. Vee Fit

2. Square Fit

3. Half Round Fit

4. Dovetail Fit

Black Smithy 1. Round rod to Square

2. S-Hook

3. Round Rod to Flat Ring

4. Round Rod to Square headed bolt

House Wiring 1. Parallel / Series Connection of three bulbs

2. Stair Case wiring

3. Florescent Lamp Fitting

4. Measurement of Earth Resistance

Tin Smithy 1. Taper Tray

2. Square Box without lid

3. Open Scoop

4. Funnel

IT WORKSHOP

1. System Assembling, Disassembling and identification of Parts / Peripherals

2. **Operating System Installation**-Install Operating Systems like Windows, Linux along with necessary Device

Drivers.

3. MS-Office / Open Office

a. **Word** - Formatting, Page Borders, Reviewing, Equations, symbols.

b. **Spread Sheet** - organize data, usage of formula, graphs, charts.

c. **Power point** - features of power point, guidelines for preparing an effective presentation.

d. **Access**- creation of database, validate data.

I Year - II Semester

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ENGINEERING WORKSHOP & IT WORKSHOP

4. **Network Configuration & Software Installation**-Configuring TCP/IP, proxy and firewall settings. Installing application software, system software & tools.

5. **Internet and World Wide Web**-Search Engines, Types of search engines, netiquette, cyber hygiene.

6. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.

7. **MATLAB-** basic commands, subroutines, graph plotting.

8. **LATEX**-basic formatting, handling equations and images.

TEXT BOOKS:

1. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern Economy Edition.

2. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition ByGary B. Shelly, Misty E. Vermaat and Thomas J. Cashman (2007, Paperback).

3. LATEX- User's Guide and Reference manual, Leslie Lamport, Pearson, LPE, 2/e.

4. Getting Started with MATLAB: A Quick Introduction for Scientists and ngineers, Rudraprathap, Oxford University Press, 2002.

5. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008

6. The Complete Computer upgrade and repair book, 3/e, Cheryl A Schmidt, Dreamtech.

7. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.

8. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

Program Name: MECH Faculty Name: C.SRILATHA

Class	Semester	Title of The Paper	Paper Code	W.E.F
II	I	Material Science and Metallurgy	R1621031	18/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
65 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

- To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

Course Outcomes:

1.Understand the basic concepts of bonds in metals and alloys, basic requirements for the formation of solid solutions and other compounds.
2.Understand the regions of stability of the phases that can occur in an alloy system in order to solve the problems in practical metallurgy.
3.Distinguish different types of cast irons, steels their properties and practical applications.
4.Understand the affect of various alloying elements on iron-iron carbide system, various heat treatment and strengthening processes used in practical applications.
5.Understand the properties and applications of widely used non-ferrous metals and alloys.
6.Understand the properties and applications of ceramic, composite and other advanced materials.

UNIT – I

Structure of Metals and Constitution of alloys: Bonds in Solids – Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size. Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron
compounds.

UNIT –II

Equilibrium Diagrams : Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd and Fe-Fe_3C.

UNIT –III

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

UNIT – IV

Heat treatment of Alloys: Effect of alloying elements on Fe-Fe_3C system, Annealing, normalizing, hardening, TTT diagrams, tempering , hardenability, surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

UNIT – V

Non-ferrous Metals and Alloys: Structure and properties of Copper and its alloys, Aluminium and its alloys, Titanium and its alloys.

UNIT – VI

Ceramic and composite materials: Crystalline ceramics, glasses, cermets, abrasive materials, nanomaterials – definition, properties and applications of the above. Classification of composites, various methods of component manufacture of composites, particle – reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal – matrix composites and C – C composites.

Program Name: MECHANICAL Faculty Name: G.RAVALI

Class	Semester	Title of The Paper	Paper Code	W.E.F
II	I	THERMODYNAMICS	R16210303	11/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
80 Hours	Theory 6	Practical	3	Internal 30	External 70	3

Programme Outcomes:

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **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.
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.
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.

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.
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.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **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.
11. **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.
12. **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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.
2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs
3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

1. The student should be able to understand the basic concepts like thermodynamic system, its boundary and related fundamental definitions. Distinction between point function and path function shall be made with respect to energy, work and Heat.

2. To learn the first law of thermodynamics, which is also the energy conservation principle, and should be able to apply to different thermodynamic systems. To understand the concept of equality of temperature and the principle of operation of various temperature measuring devices.

3. To understand the second law statements and the associated terms and should be able to apply the principles to heat engines. Able to analyse the concepts of Carnot cycle, entropy, availability and irreversibility.

4. To understand the process of steam formation and its representation on property diagrams with various phase changes and should be able to calculate the quality of steam after its expansion in a steam turbine, with the help of standard steam tables and charts..

5. To make students to use Psychrometric chart and calculate various psychrometric properties of air.

6. To understand the concept of air standard cycles and should be able to calculate the efficiency and performance parameters of the systems that use these cycles.

Course Outcomes:

1. Understand the basics of thermodynamics.
2. Understand the concept of thermometry and learn energy conversions during various processes.
3. Understand the second law of thermodynamics and working of heat engine, heat pump.
4. Understand phase change process and working of steam turbines.
5. Understand psychrometric properties.
6. Understand the working of air standard cycles and refrigeration cycles.

SYLLABUS:

UNIT – I

Introduction: Basic Concepts : System, boundary, Surrounding, control volume, Universe, Types of Systems,Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property,Process, Cycle – Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility – Energy inState and in Transition, Types, Work and Heat, Point and Path function. Zeroth Law of Thermodynamics –Concept of Temperature – Principles of Thermometry –Reference Points – Const. Volume gas Thermometer

Scales of Temperature, Ideal Gas Scale – PMM I.

UNIT – II

Joule's Experiments – First law of Thermodynamics – Corollaries – First law applied to a Process – applied to a flow system – Steady Flow Energy Equation. PMM-I, throttling and free expansion processes – deviations fromperfect gas model – Vander waals equation of state – compressibility charts – variable specific heats – gas tables

UNIT – III

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

of Temperature, Clausius Inequality, Entropy, Principle of Entropy Increase – Energy Equation, Availability and Irreversibility –Thermodynamic Potentials, Gibbs and Helmholtz Functions, Maxwell Relations – Elementary Treatment of the

Third Law of Thermodynamics.

UNIT – IV

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

UNIT – V

Mixtures of perfect Gases – Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction , Volume fraction and partial pressure,Equivalent Gas const. And Molecular Internal Energy, Enthalpy, sp. Heats and Entropy of Mixture of perfect Gases and Vapour, Atmospheric air - Psychrometric Properties – Dry bulb Temperature, Wet Bulb Temperature,Dew point Temperature, Thermodynamic Wet Bulb Temperature, Specific Humidity, Relative Humidity,

saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation , Carrier's Equation – Psychrometric

chart.

UNIT VI

. **Power Cycles :** Otto, Diesel, Dual Combustion cycles, Sterling Cycle, Atkinson Cycle, Ericcson Cycle, Lenoir Cycle – Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles.

Refrigeration Cycles : Brayton and Rankine cycles – Performance Evaluation – combined cycles, Bell-Colemancycle, Vapour compression cycle-performance Evaluation

Program Name: B.Tech Faculty Name: T.Mutyala Raju

Class	Semester	Title of The Paper	Paper Code	W.E.F
II	I	Fluid Mechanics &Hydraulic Machinery		6

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
60 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **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.

3. **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.

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.

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.

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.

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.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **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.

11. **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.

12. **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.

Programme Specific Outcomes:

1. Knowledge of contemporary issues in the civil engineering industry to solve societal issues.

2. Qualify in competitive examinations for higher education and employment.

Course Objectives:

1. Study Physical properties of fluids, Pascal's law, Hydrostatic law & different Pressure measuring devices.
2. Learn classification of Fluid flow, Hydrostatic forces on submerged plane surfaces, Continuity equation and flow net analysis.

3. Familiarize the concept of Navier -Stokes, Bernoulli's, Euler's and Impulse momentum equations on a Pipes & Pipe bend.
4. Study the Characteristics of Boundary layer along a thin flat plate, Derive Vonkarmen momentum integral equation, concept of drag & lift.
5. Learn laws of fluid friction, Reynold's experiment, major loss by Darcy's equation & minor losses in pipe flow. TEL & HGL, Moody's Chart & to design pipe networks.
6. Determine the Velocity by Pitot tube & Discharge of flow through Channels & pipes by & Notches, Weirs &Venturimeter, Orifice meter.
7. Learn Hydrodynamic force of jets on different shaped stationary and moving vanes, velocity triangles at inlet and outlet, work done and efficiency-Angular momentum principle, Applications to radial flow turbines.
8. Study about working, workdone, efficiency & velocity triangles of Pelton wheel, Francis & Kaplan turbine & Draft tube theory.
9. Learn about centrifugal & reciprocating pumps working, workdone, efficiency, specific speed, characteristic curves & cavitation.

Course Outcomes:

1. Know the concept of fluid and its properties, manometry, hydrostatic forces acting on different surfaces and also problem solving techniques.
2. Exposed to the basic laws of fluids, flow patterns, viscous flow through ducts and their corresponding problems.
3. Aware of the concepts related to boundary layer theory, flow separation, basic concepts of velocity profiles, dimensionless numbers and dimensional analysis.
4. Know the hydrodynamic forces acting on vanes and their performance evaluation.
5. Aware of the importance, function and performance of hydro machinery.
6. Evaluate the performance characteristics of hydraulic turbines. Also a little knowledge on hydraulic systems and fluidics is imparted to the student.

Syllabus:

UNIT I

Fluid statics: Dimensions and units: physical properties of fluids- specific gravity, viscosity and its significance, surface tension, capillarity, vapor pressure. Atmospheric gauge and vacuum pressure – measurement of pressure. Manometers- Piezometer, U-tube, inverted and differential manometers. Pascal's law, hydrostatic law. Buoyancy and floatation: Meta center, stability of floating body. Submerged bodies. Calculation of metacenter height. Stability analysis and applications.

UNIT-II

Fluid kinematics: Introduction, flow types. Equation of continuity for one dimensional flow, circulation and vorticity, Stream line, path line and streak lines and stream tube. Stream function and velocity potential function, differences and relation between them. Condition for irrotational flow, flow net, source and sink, doublet and vortex flow. Fluid dynamics: surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its applications, force on pipe bend. Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line.

UNIT-III

Boundary Layer Theory: Introduction, momentum integral equation, displacement, momentum and energy thickness, separation of boundary layer, control of flow separation, Stream lined body, Bluff body and its applications, basic concepts of velocity profiles.

Dimensional Analysis: Similitude and modelling – Dimensionless numbers.

UNIT-IV

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

UNIT-V

Centrifugal pumps: classification, working, work done – manometric head- losses and efficiencies- specific speed- pumps in series and parallel-performance characteristic curves, cavitation & NPSH. Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

UNIT-VI

Hydraulic Turbines: classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube-theory- functions and efficiency. Performance of hydraulic turbines: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer. Hydraulic systems- hydraulic ram, hydraulic lift, hydraulic coupling. Fluidics – amplifiers, sensors and oscillators. Advantages, limitations and applications.

Program Name: MECHANICAL Faculty Name: P.VINAY

Class	Semester	Title of The Paper	Paper Code	W.E.F
II	I	MECHANICS OF SOLIDS	R1621032	11/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
86 Hours	Theory 6	Practical	3	Internal 30	External 70	3

Programme Outcomes:

13. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
14. **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
15. **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.
16. **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.
17. **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.

18. **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.
19. **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.
20. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
21. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
22. **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.
23. **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.
24. **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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.
2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs
3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

7. After studying this unit student will know the basic terms like stress, strain poissons ratio…etc and stresses in bars of varying cross sections, composite bars, thermal stress in members, stresses on inclined planes with analytical approach and graphical approach, strain energy under different loadings and also problem solving techniques.

8. After studying this unit student will know the construction of shear force diagrams and bending moment diagrams to the different loads for the different support arrangements and also problem solving techniques.

9. After studying this unit student will know the bending and shear stress induced in the beams which are made with different cross sections like rectangular, circular, triangular, I, T angle sections and also problem solving techniques.

10. After studying this unit student will know how to finding slope and deflection for different support arrangements by Double integration method, Macaulay's method and Moment-Area and also problem solving techniques.

11. After studying this unit student will know how a cylinder fails, what kind of stresses induced in cylinders subjected to internal, external pressures and also problem solving techniques.

12. After studying this unit student will know shear stresses induced in circular shafts, discussing columns in stability point of view and columns with different end conditions.

Course Outcomes:

1.Determine Stress, Strain & Strain Energy in Uniform, Varying cross section and Composite Bars & Appraise Principal stresses & Strains analytically, Graphically ..
2.Sketch Shear Force & Bending Moment diagrams, for different beams subjected to various types of loading.
3.Derive the equation of bending, Determination of bending stresses in beams of various cross sections for different loading conditions ; Design of simple beams & Determine Shear stresses in beams for different cross sections and its distribution.
4.Determine slope & deflection in beams of different cross sections and end conditions for various types of loading using different methods.
5.Estimate stresses and strains in Thin & Thick Cylinders and Spherical shells.
6.Evaluate Torque & Power of circular shafts by using Torsional equation & Examine the Crippling & Safe loads using Euler's & Rankine's theories for the columns with different end conditions.

SYLLABUS:

UNIT – I

SIMPLE STRESSES & STRAINS : Elasticity and plasticity – Types of stresses & strains–Hooke's law – stress– strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Bars of varying section – composite bars – Temperature stresses- Complex Stresses - Stresses on an inclined plane under different uniaxial and biaxial stress conditions - Principal planes and principal stresses - Mohr's circle - Relation between elastic constants, Strain energy – Resilience – Gradual, sudden, impact and shock loadings.

UNIT – II

SHEAR FORCE AND BENDING MOMENT : Definition of beam – Types of beams – Concept of shear force
and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected
to point loads, u.d.l, uniformly varying loads and combination of these loads – Point of contra flexure – Relation
between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

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

SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T angle sections.

UNIT – IV

DEFLECTION OF BEAMS : Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L uniformly varying load. Mohr's theorems – Moment area method – application to simple cases including overhanging beams, Statically Indeterminate Beams and solution methods.

UNIT – V

THIN CYLINDERS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders – Riveted boiler shells – Thin spherical shells.

THICK CYLINDERS: –lame's equation – cylinders subjected to inside & outside pressures –compound cylinders.

UNIT VI

TORSION: Introduction-Derivation- Torsion of Circular shafts- Pure Shear-Transmission of power by circular
shafts, Shafts in series, Shafts in parallel.

COLUMNS:

Buckling and Stability, Columns with Pinned ends, Columns with other support Conditions, Limitations of Euler's Formula, Rankine's Formula.

Program Name: MECHANICAL-A&B Faculty Name: **U. Ravi Kiran**

Class	Semester	Title of The Paper	Paper Code	W.E.F
II	I	**MANAGERIAL ECONOMICS &FINANCIAL ANALYSIS**	**RT21034**	19/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
73 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

PSO2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

PSO3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting,

Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.

 To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.

 To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

Course Outcomes:

CO1: Understand the Law of Demand

CO2: Understand the concept of Break-Even Analysis.

CO3 Understand the different types of market situations.

CO4: Understand different types of Business Organizations.

CO5: Understand financial statements and analyse them.

CO6: Understand Capital Budgeting Process.

UNIT-I

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –

Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of

Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand

forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

UNIT – II:

Production and Cost Analysis:

Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to

scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs,

Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)-Managerial significance and limitations of Breakeven point.

UNIT – III:

Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price

and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of

Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing.

UNIT – IV:

Types of Business Organization and Business Cycles:

Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their

forms – Business Cycles : Meaning and Features – Phases of a Business Cycle.

UNIT – V:

Introduction to Accounting & Financing Analysis:

Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of

Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)

UNIT – VI:

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method,

Internal Rate of Return Method and Profitability Index)

TEXT BOOKS

1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications,

New Delhi – 2011

2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011

3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

Program Name: MECHANICAL-A&B Faculty Name: **T.V.S. Harsha**

Class	Semester	Title of The Paper	Paper Code	W.E.F
II	I	**COMPUTER AIDED ENGINEERING DRAWING PRACTICE**	**RT21036**	19/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
72 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

PSO2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

PSO3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

To enhance the student's knowledge and skills in engineering drawing and to introduce drafting packages and commands for computer aided drawing and modelling.

Course Outcomes:

CO1: Draw projection of solids by using auxiliary plane method.

CO2: Draw different views on sections, development and interpenetration of solids.

CO3: Understand the concept of Isometric and perspective projections.

CO4: Draw two-dimensional sketches, views in CAD environment.

CO5: Create geometrical model of simple solids and machine parts.

CO6: Draw isometric projections, orthographic projections from isometric projections using CAD

.

UNIT-I:

Objective: The knowledge of projections of solids is essential in 3D modelling and animation. The student will
be able to draw projections of solids. The objective is to enhance the skills they already acquired in their earlier
course in drawing of projection.

PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to both planes – Auxiliary Views.

UNIT-II:

The knowledge of sections of solids and development of surfaces is required in designing and manufacturing of
the objects. Whenever two or more solids combine, a definite curve is seen at their intersection.

SECTIONS OF SOLIDS: Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid,
Cone – Auxiliary views.

DEVELOPMENT AND INTERPENETRATION OF SOLIDS: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts.

UNIT-III:

The intersection of solids also plays an important role in designing and manufacturing. The objective is to impart
this knowledge through this topic. A perspective view provides a realistic 3D View of an object. The objective is
to make the students learn the methods of Iso and Perspective views.

INTERPENETRATION OF RIGHT REGULAR SOLIDS: Intersection of Cylinder Vs Cylinder, Cylinder Vs
Prism, Cylinder Vs Cone, Prism Vs Cone.

PERSPECTIVE PROJECTIONS: Perspective View: Points, Lines, Plane Figures and Simple Solids,

Vanishing Point Methods (General Method only).

In part B computer aided drafting is introduced.

UNIT IV:

The objective is to introduce various commands in AutoCAD to draw the geometric entities and to create 2D and 3D wire frame models.

INTRODUCTION TO COMPUTER AIDED DRAFTING: Generation of points, lines, curves, polygons, dimensioning. Types of modeling : object selection commands – edit, zoom, cross hatching, pattern filling, utility

commands, 2D wire frame modeling, 3D wire frame modeling,.

UNIT V:

By going through this topic the student will be able to understand the paper-space environment thoroughly.

VIEW POINTS AND VIEW PORTS: view point coordinates and view(s) displayed, examples to exercise different options like save, restore, delete, joint , single option.

UNIT VI:

The objective is to make the students create geometrical model of simple solids and machine parts and display the

same as an Isometric, Orthographic or Perspective projection.

COMPUTER AIDED SOLID MODELLING: Isometric projections, orthographic projections of isometric projections, Modeling of simple solids, Modeling of Machines & Machine Parts.

Text Books :

1. Engineering drawing by N.D Bhatt, Charotar publications.
2. Engineering Graphics, K.C. john, PHI Publications

Program Name: ME-A&B Faculty Name: C.Srilatha/Ch. Saraswathi

Class	Semester	Title of The Paper	Paper Code	W.E.F
II	I	**MECHANICS OF SOLIDS & METALLURGY LAB**	RT21038	19/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
33 Hours	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1. Specify, architect, design and analyze systems that efficiently generate, transmit, distribute and utilize electrical power.

PSO2. Analyze and design modern electrical drive systems and modern lighting systems.

PSO3. Understand the principles and construction of electrical machines and determine their performance through testing.

PSO4. Specify, design, implement and test analog and embedded signal processing electronic systems using the state of the art components and software tools.

Course Objectives:

Course Objective: To impart practical exposure on the microstructures of various materials and their hardness evaluation. Also to impart practical knowledge on the evaluation of material properties through various destructive testing procedures.

Course Outcomes:

CO1: Predict and interpret the behavior of the material under normal external loads, impact loads and torsion.

CO2: Characterize the microstructures of different ferrous and non-ferrous metals & identify the effect of heat treatment on the hardness of steels.

SYLLABUS:

(A) MECHNICS OF SOLIDS LAB :

1. Direct tension test
2. Bending test on

a) Simple supported

b) Cantilever beam

3. Torsion test
4. Hardness test

a) Brinells hardness test

b) Rockwell hardness test

5. Test on springs
6. Compression test on cube
7. Impact test
8. Punch shear test

(B) METALLURGY LAB:

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels.
3. Study of the Micro Structures of Cast Irons.
4. Study of the Micro Structures of Non-Ferrous alloys.
5. Study of the Micro structures of Heat treated steels
6. Hardenability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.

Program Name: ME-A&B Faculty Name: A Sai Pallavi/R.Rajesh/Sk.M Ahmed

Class	Semester	Title of The Paper	Paper Code	W.E.F
II	I	**BASIC ELECTRICAL & ENGG. LAB**	**RT21037**	19/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
33 Hours	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1. Specify, architect, design and analyze systems that efficiently generate, transmit, distribute and utilize electrical power.
PSO2. Analyze and design modern electrical drive systems and modern lighting systems.
PSO3. Understand the principles and construction of electrical machines and determine their performance through testing.
PSO4. Specify, design, implement and test analog and embedded signal processing electronic systems using the state of the art components and software tools.

Course Objectives:

 To predetermine the efficiency of dc shunt machine using Swinburne's test.
 To predetermine the efficiency and regulation of 1-phase transformer with O.C and S.C tests.
 To obtain performance characteristics of DC shunt motor &3-phase induction motor.
 To find out regulation of an alternator with synchronous impedance method.
 To control speed of dc shunt motor using speed control methods.
 To find out the characteristics of PN junction diode & transistor
 To determine the ripple factor of half wave & full wave rectifiers.

Course Outcomes:

CO1: Find out the efficiency of dc shunt machine without actual loading of the machine.
CO2: Estimate the efficiency and regulation for different load conditions and power factors of single phase transformer with OC and SC test.

CO3 Analyse the performance characteristics and to determine efficiency of DC shunt motor &3-phase induction motor.

CO4: Pre-determine the regulation of an alternator by synchronous impedance method.
CO5: Control the speed of dc shunt motor using speed control methods

CO6: Find out the characteristics of PN junction diode & transistor

SYLLABUS:

1. Swinburne's test on D.C. Shunt machine (Predetermination of efficiency of a given D.C.Shunt machine working as motor and generator).
2. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power
factors).

3. Brake test on 3-phase Induction motor (Determination of performance characteristics)
4. Regulation of alternator by Synchronous impedance method.
5. Speed control of D.C. Shunt motor by
a) Armature Voltage control b) Field flux control method
6. Brake test on D.C. Shunt Motor.

Section B: Electronics Engineering.

The following experiments are required to be conducted as compulsory experiments:
1.PN junction diode characteristics a) Forward bias b) Reverse bias (Cut in voltage and resistance calculations)
2. Transistor CE characteristics (Input and output)
3. Half wave rectifier with and with out filters.
4. Full wave rectifier with and with out filters.
5. CE amplifiers.
6. OP- Amp applications (inverting, non inverting, integrator and differentiator)

Program Name: MECHANICAL-A&B Faculty Name CH.JEEVAN PAUL

.Class	Semester	Title of The Paper	Paper Code	W.E.F
II	II	KINEMATICS OF MACHINARY	R1622021	19/11/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
75 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

PSO2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

PSO3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

1.The students completing this course are expected to understand the nature and role of the kinematics of machinery, the mechanisms and machines.
2.The course includes velocity and acceleration diagrams, analysis of mechanisms joints, Cams and their applications.
3.It exposes the students to various kinds of power transmission devices like belt, rope , chain and gear drives and their working principles and their merits and demerits.

Course Outcomes:

- **CO 1:** To make student understand the purpose of kinematics, Kinematic joint and mechanism and to study the relative motion of parts in a machine without taking into consideration the forces involved.
- **CO 2:** To make student understand various mechanisms for straight line motion and their applications including steering mechanism
- **CO 3:**To make student understand the velocity and acceleration concepts and the methodology using graphical methods and principles and application of four bar chain. To understand the application of slider crank mechanism etc. and study of plane motion of the body.
- **CO 4:** To understand the theories involved in cams. Further the students are exposed to the applications of cams and their working principles.
- **CO 5:** To understand gears, power transmission through different types of gears including gear profiles and its efficiency
- **CO 6:** To understand various power transmission mechanisms and methodologies and working principles

Syllabus:

UNIT – I

MECHANISMS : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained . Grublers criterion , Grashoff's law , Degrees of freedom, Kutzbach criterion for planar mechanisms, Mechanism and machines – classification of machines – kinematic chain – inversion of

mechanism – inversion of mechanism – inversions of quadric cycle, chain – single and double slider crank chains.

UNIT – II

LOWER PAIR MECHANISM: Exact and approximate copiers and generated types – Peaucellier, Hart and Scott Russel – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph. Conditions for correct steering – Davis Steering gear, Ackermans steering gear – velocity ratio; Hooke's Joint: Single and double – Universal coupling–application–problems.

UNIT – III

KINEMATICS: Velocity and acceleration – Motion of a link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain. Velocity and acceleration analysis of for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

Plane motion of body: Instantaneous centre of rotation, centroids and axodes – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT-IV

CAMS

Definitions of cam and followers – their uses – Types of followers and cams – Terminology –Types of follower motion: Uniform velocity, Simple harmonic motion and uniform acceleration and retardation. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases. Analysis of motion of followers: Roller follower – circular cam with straight, concave and convex flanks.

UNIT – V

GEARS

Higher pairs, friction wheels and toothed gears–types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

UNIT – VI

Power Transmissions : Introduction, Belt and rope drives, selection of belt drive- types of belt drives,V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio,classification of chains.

Introduction to gear Trains, Train value, Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epicyclic gear trains. Selection of gear box-Differential gear foran automobile.

Text Books :

1. Theory of Machines / S.S Rattan/ Mc. Graw Hill
2. Mechanism and machine theory /Ashok G. Ambedkar/PHI Publications.

References :

1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
2. Theory of Machines / Shigley / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers
4. Theory of machines / Khurmi/S.Chand.

Program Name: MECHANICAL Faculty Name: G.RAVALI

Class	Semester	Title of The Paper	Paper Code	W.E.F
II	II	THERMAL ENGINEERING-I	R16220302	19/11/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
80 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

25. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
26. **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
27. **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.
28. **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.
29. **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.
30. **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.
31. **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.
32. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
33. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

34. **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.
35. **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.
36. **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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.
2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs
3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

1.To make the student learn and understand the reasons and affects of various losses that occur in the actual engine operation

2.To familiarize the student with the various engine systems along with their function and necessity.

3.To learn about normal combustion phenomenon and knocking in S.I. and C.I. Engines and to ind the several engine operating parameters that affect the smooth engine operation.

4.To make the student learn to perform testing on S.I and C.I Engines for the calculations of performance and emission parameters.

5.To make students learn about different types of compressors and to calculate power and efficiency of reciprocating compressors.

6.To make students learn mechanical details, and to calculate power and efficiency of rotary compressors

Course Outcomes:

1. Explain the air standard cycles and discuss the parameters differentiate actual cycles from air standard cycles.
2. Demonstrate knowledge on operating conditions and characteristics of internal combustion engines.
3. Understand the concept of combustion and knocking parameters.
4. Calculate Performance parameters like Brake power, Indicated power & various efficiencies.
5. Understand the working principle of reciprocating compressors.
6. Apply thermodynamic laws in engineering applications and demonstrate working of compressors which are involving energy flows.

SYLLABUS:

UNIT – I

Actual Cycles and their Analysis: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blowdown-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines.

UNIT – II

I. C. ENGINES : Classification - Working principles, Valve and Port Timing Diagrams, - Engine systems – Fuel, Carburettor, Fuel Injection System, Ignition, Cooling and Lubrication, principle of wankle engine, principles of supercharging and turbo charging.

UNIT – III

Combustion in S.I. Engines : Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Types of Abnormal combustion, pre-ignition and knocking (explanation of) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

Combustion in C.I. Engines : Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

UNIT – IV

Measurement, Testing and Performance: Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet and chart.

UNIT – V

COMPRESSORS – Classification –positive displacement and roto dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

Reciprocating: Principle of operation, work required, Isothermal efficiency, volumetric efficiency and effect of clearance, multi stage compression, undercooling, saving of work, minimum work condition for two stage compression.

UNIT VI

Rotary (Positive displacement type) : Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations. Dynamic Compressors: Centrifugal compressors: Mechanical details and principle of operation – velocity and pressure variation. Energy transfer-impeller blade shape-losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power.

Axial Flow Compressors: Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency- pressure rise calculations – Polytropic efficiency.

Program Name: MECH Faculty Name: C.SRILATHA

Class	Semester	Title of The Paper	Paper Code	W.E.F
II	II	Production Technology	R1622033	18/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
65 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

To impact basic knowledge and understand about the primary manufacturing processes such as casting, joining, forming and powder metallurgy and their relevance in current manufacturing industry to introduce processing methods of plastics.

Course Outcomes:

- To make the understand fundamentals of castings.
- To provide insight into sand casting and introduce other casting processes.
- To impart fundamentals of gas welding and arc welding.
- To teach principles of advanced welding processes and their applications.
- To impart knowledge on bulk forming processes.
- To provide understanding of various sheet metal forming and processing of plastics.

UNIT I: CASTING

Steps involved in making a casting- Advantages of casting and its applications. Patterns and pattern making- Types of patterns- Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems.

UNIT II:

Methods of melting and types of furnaces, Solidification of castings, Solidification of pure metals and alloys, short & long freezing range alloys. Risers- Types, function and design, casting design considerations, Basic principles and applications of Centrifugal casting, Die casting and Investment casting.

UNIT III: Welding

Classification of welding processes, types of welded joints and their characteristics, Gas welding, Different types of flames and uses, Oxy – Acetylene Gas cutting. Basic principles of Arc welding, Manual metal arc welding, submerged arc welding, and Inert Gas welding- TIG & MIG welding.

UNIT IV:

Resistance welding, Solid state welding processes- Friction welding, Friction stir welding, Forge welding, Explosive welding; Thermit welding, Plasma welding, Laser welding, electron beam welding, Soldering & Brazing.

Heat affected zones in welding; pre & post heating, Weldability of metals, welding defects – causes and remedies – destructive and non destructive testing of welds, Design of welded joints.

UNIT V:

Plastic deformation in metals and alloys, Hot working and Cold working, Strain hardening and Annealing. Bulk forming processes: Forging - Types Forging, Smith forging, Drop Forging, Roll forging, Forging hammers, Rotary forging, forging defects; Rolling – fundamentals, types of rolling mills and products, Forces in rolling and power requirements. Extrusion and its characteristics. Types of extrusion, Impact extrusion, Hydrostatic extrusion; Wire drawing and Tube drawing.

Introduction to powder metallurgy – compaction and sintering, advantages and applications.

UNIT VI:

Sheet metal forming - Blanking and piercing, Forces and power requirement in these operations, Deep drawing, Stretch forming, Bending, Spring back and its remedies, Coining, Spinning, Types of presses and press tools. High energy rate forming processes: Principles of explosive forming, electromagnetic forming, Electro hydraulic forming, rubber pad forming, advantages and limitations. Processing of Plastics: Types of Plastics, Properties, Applications and their processing methods, Blow and Injection moulding.

Program Name: **Mechanical Engineering** Faculty Name: **M. MADHU SUDHANA RAO**

Class	Semester	Title of The Paper	Paper Code	W.E.F
II	II	DESIGN OF MACHINE MEMBERS-I	RT22034	11/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
92 Hours	Theory 6	Practical	3	Internal 30	External 70	3

PROGRAMME OUTCOMES:

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, 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.

PROGRAMME SPECIFIC OUTCOMES:

PSO1.Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

PSO2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

PSO3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices

COURSE OBJECTIVES:

1. The student shall gain appreciation and understanding of the design function in mechanical engineering, the steps involved in designing and the relation of design activity with manufacturing activity
2. Selection of proper materials to different machine elements based on their physical and mechanical properties.
3. Learn and understanding of the different types of failure modes and criteria.
4. Procedure for the different machine elements such as fasteners, shafts, couplings, keys, axially loaded joints etc.

COURSE OUTCOMES:

CO1: Apply the design procedure to engineering problems, including the consideration of technical and manufacturing constraints.

CO2: Explain the component subjected to loads and identify the failure criteria and design the elements for strength, stiffness and fatigue.

CO3: Calculate the stresses and strains induced in machine elements including riveted, bolted and welded joints.

CO4: Compute combined loading for strength and rigidity of keys, cotters, shafts to ensure safe design.

CO5: Categorize various types of coupling joints subjected to torsional loading to calculate the induced stresses developed to ensure safe design.

CO6: Design of various springs under fatigue loading to calculate static and dynamic stresses developed.

COURSE CONTENT:

UNIT – I INTRODUCTION: General considerations in the design of Engineering Materials and their properties – selection –Manufacturing consideration in design, tolerances and fits –BIS codes of steels. **STRESSES IN MACHINE MEMBERS:** Simple stresses – combined stresses – torsional and bending stresses – impact stresses – stress strain relation – various theories of failure – factor of safety – design for strength and rigidity – preferred numbers. The concept of stiffness in tension, bending, torsion and combined situations – static strength design based on fracture toughness.

UNIT – II STRENGTH OF MACHINE ELEMENTS: Stress concentration – theoretical stress concentration factor – fatigue stress concentration factor notch sensitivity – design for fluctuating stresses – endurance limit – estimation of endurance strength – Goodman's line – Soderberg's line – modified Goodman's line.

UNIT – III Riveted and welded joints : design of joints with initial stresses – eccentric loading. Bolted joints – design of bolts with pre-stresses – design of joints under eccentric loading – locking devices – both of uniform strength, different seals.

UNIT – IV KEYS, COTTERS AND KNUCKLE JOINTS: Design of keys-stresses in keys-cotter joints-spigot and socket, sleeve and cotter, jib and cotter joints- knuckle joints. SHAFTS: Design of solid and hollow shafts for strength and rigidity – design of shafts for combined bending and axial loads – shaft sizes – BIS code. Use of internal and external circlips, gaskets and seals (stationary & rotary).

UNIT – V SHAFT COUPLING: Rigid couplings – muff, split muff and flange couplings, flexible couplings – flange coupling (modified).

UNIT – VI MECHANICAL SPRINGS: Stresses and deflections of helical springs – extension - compression springs – springs for fatigue loading, energy storage capacity – helical torsion springs – co-axial springs, leaf springs. Note: Design data book is NOT Permitted for examination

Text Books:

1. Machine Design/V.Bandari/ TMH Publishers

2. Machine design / NC Pandya& CS Shah/Charotar Publishing House Pvt. Limited

3. Design data book of Engineers

References: 1. Design of Machine Elements / V.M. Faires/McMillan

2. Machine design / Schaum Series/McGrawHill Professional

3. Machine Design/ Shigley, J.E/McGraw Hill.

4. Design data handbook/ K.Mahadevan& K. Balaveera Reddy/ CBS publishers.

5. Design of machine elements-Spotts/Pearson Publications

6. Machine Design –Norton/ Pearson publishers

Program Name: **MECHANICAL** Faculty Name: **VIJAY SRIHARSHA TANGELLA**

Class	Semester	Title of The Paper	Paper Code	W.E.F
II	II	MACHINE DRAWING	R1621035	19/11/2018

SYLLABUS

Total No. of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
	Theory	Practical		Internal	External	
69 Hours	6		3	30	70	3

PROGRAMME OUTCOMES:

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, 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.

PROGRAMME SPECIFIC OUTCOMES:

PSO 1: Ability to analyze and solve the problems in the domains of design, thermal and allied fields.

PSO 2: Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs.

PSO 3: Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

COURSE OBJECTIVES:

The student will acquire knowledge of fastening arrangements such as welding, riveting the different styles of attachment for shaft. The student also is enabled to prepare the assembly of various machine or engine components and miscellaneous machine components.

COURSE OUTCOMES:

CO1: Remember the conventional representations of materials and machine elements.

CO2: Draw different views of thread profiles such as V-sharp, whit-worth, Buttress, square, ACME, worm, Bolts & Nuts, keys, cotters, pin joints, Riveted joints, shaft couplings and Bearings.

CO3: Interpret assembly drawings such as Engine parts, Machine tool parts & accessories, Miscellaneous parts (screw jack, swivel bearing, pipe vice) with moderate complexity

SYLLABUS:

Machine Drawing Conventions:

Need for drawing conventions – introduction to IS conventions

a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.

b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
d) Title boxes, their size, location and details - common abbreviations & their liberal usage.
e) Types of Drawings – working drawings for machine parts.

I. Drawing of Machine Elements and simple parts

Objective: To provide basic understanding and drawing practice of various joint, simple mechanical parts Selection of Views, additional views for the following machine elements and parts with every drawing proportion.

a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
b) Keys, cottered joints and knuckle joint.
c) Riveted joints for plates
d) Shaft coupling, spigot and socket pipe joint.
e) Journal, pivot and collar and foot step bearings.

II. Assembly Drawings:

Objective: The student will be able to draw the assembly from the individual part drawing.

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

a) Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.
b) Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.
c) Valves: Steam stop valve, spring loaded safety valve, feed check valve and air cock.

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

Program Name: ME-A&B Faculty Name: N.V. Malavika/C.Srilatha

Class	Semester	Title of The Paper	Paper Code	W.E.F
II	II	Production Technology	R16	19/11/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
33 Hours	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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.

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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.

Programme Specific Outcomes:

PSO1. Specify, architect, design and analyze systems that efficiently generate, transmit, distribute and utilize electrical power.
PSO2. Analyze and design modern electrical drive systems and modern lighting systems.
PSO3. Understand the principles and construction of electrical machines and determine their performance through testing.
PSO4. Specify, design, implement and test analog and embedded signal processing electronic systems using the state of the art components and software tools.

Course Objectives:

To impart hands-on practical exposure on manufacturing processes and equipment.

Course Outcomes:

CO1. Illustrate the basic manufacturing processes like Casting, Welding, Metal Forming and Plastics moulding.

SYLLABUS:

I. METAL CASTING :

1. Pattern Design and making - for one casting drawing.
2. Sand properties testing - for strength and permeability
3. Mould preparation, Melting and Casting

II WELDING:

1. Gas welding
2. Gas cutting
3. Manual metal arc welding - Lap & Butt Joints
4. TIG/MIG Welding
5. Resistance Spot Welding
6. Brazing and soldering

III METAL FORMING AND POWDER METALLURGY:

1. Blanking & Piercing operations and study of simple, compound and progressive dies.
2. Deep drawing and extrusion operations.
3. Bending and other operations
4. Basic powder compaction and sintering

IV PROCESSING OF PLASTICS

1. Injection Moulding
2. Blow Moulding

Program Name: mechanical engineering Faculty Name: V.Chandrika

Class	Semester	Title of The Paper	Paper Code	W.E.F
II	II	FM&HM LAB		19/11/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
30	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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.

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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.

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PO9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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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.

Programme Specific Outcomes:

PSO1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.
PSO2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs
PSO3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices

Course Objectives:

To impart practical exposure on the performance evaluation methods of various flow measuring equipment and hydraulic turbines and pumps.

Course Outcomes:

Understand the performance of different turbines,pumps and floe measuring equipments.

LIST OF EXPERIMENTS

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.

Program Name: MECHANICAL-A&B Faculty Name CH.JEEVAN PAUL

.Class	Semester	Title of The Paper	Paper Code	W.E.F
III	I	DYNAMICS OF MACHINARY	R1631031	12/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
75 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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.

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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.

Programme Specific Outcomes:

PSO1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

PSO2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

PSO3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

1. To equip the student with fundamental knowledge of dynamics of machines so that student can appreciate problems of dynamic force balance, transmissibility of forces, isolation of systems, vibrations.
2. Develop knowledge of analytical and graphical methods for calculating balancing of rotary and reciprocating masses.
3. Develop understanding of vibrations and its significance on engineering design
4. Develop understanding of dynamic balancing, flywheel analysis, gyroscopic forces and moments

Course Outcomes:

- **CO 1:** Analyze stabilization of sea vehicles, aircrafts and automobile vehicles
- **CO 2:** Compute frictional losses, torque transmission of mechanical systems.
- **CO 3:** Analyze dynamic force analysis of slider crank mechanism and design of flywheel.
- **CO 4:** Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement.
- **CO 5:** Understand balancing of reciprocating and rotary masses.

Syllabus:

UNIT – I

PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships, static and dynamic force analysis of planar mechanisms, (Demonstration of models in video show).

UNIT – II

FRICTION: Inclined plane, friction of screw and nuts, pivot and collar, uniform pressure, uniform wear, friction circle and friction axis: lubricated surfaces, boundary friction, film lubrication.

CLUTCHES: Friction clutches- single disc or plate clutch, multiple disc clutch, cone clutch, centrifugal clutch. General description and operation of dynamometers: Prony, Rope brake, Epicyclic, Bevis Gibson and belt transmission,

UNIT – III

TURNING MOMENT DIAGRAMS: Dynamic force analysis of slider crank mechanism**,** inertia torque, angular velocity and acceleration of connecting rod, crank effort and turning moment diagrams – fluctuation of energy – fly wheels and their design.

UNIT-IV

GOVERNERS: Watt, porter and proell governors, spring loaded governors – Hartnell and Hartung with auxiliary springs. sensitiveness, isochronism and hunting.

UNIT – V

BALANCING: Balancing of rotating masses single and multiple – single and different planes, use analytical and graphical methods. Primary, secondary, and higher balancing of reciprocating masses. analytical and graphical methods, unbalanced forces and couples – examination of "V" multi cylinder in line and radial engines for primary and secondary balancing, locomotive balancing, hammer blow, swaying couple, variation of tractive effort.

UNIT – VI

VIBRATIONS: Free Vibration of spring mass system –Natural frequency-types of damping – damped free vibration, Simple problems on forced damped vibration, vibration isolation and transmissibility transverse loads, vibrations of beams with concentrated and distributed loads. Dunkerly's methods, Raleigh's method, whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems.

Text Books :

1. Theory of Machines / S.S Rattan/ Mc. Graw Hill
2. Mechanism and machine theory /Ashok G. Ambedkar/PHI Publications.

References :

1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
2. Theory of Machines / Shigley / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers
4. Theory of machines / Khurmi/S.Chand.

Program Name: Mechanical Faculty Name: A.V.A.R Durga Rao

Class	Semester	Title of The Paper	Paper Code	W.E.F
III	I	Metal Cutting and Machine Tools	R1631032	11/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
62 Hours	Theory 4	Practical 2	3	Internal 30	External 70	4

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to apply the acquired Mechanical Engineering knowledge to solve engineering problems utilizing advanced technology for the advancement of society and oneself with confidence.
2. Successfully apply the principles of drafting and design, to analyze and evaluate using tools to solve real time problems of structural, thermal and allied field problems resulting in significant societal development.
3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices and to become responsible citizens with ethical values.

Course Objectives:

1. The course provides students with fundamental knowledge and principles in material removal processes.
2. In this course, the students apply the fundamentals and principles of metal cutting to practical applications through multiple labs using lathes, milling machines, grinding machines, and drill presses, Computer Numerical Control etc
3. To demonstrate the fundamentals of machining processes and machine tools.
4. To develop knowledge and importance of metal cutting parameters.
5. To develop fundamental knowledge on tool materials, cutting fluids and tool wear mechanisms.
6. To apply knowledge of basic mathematics to calculate the machining parameters for different machining processes.

Course Outcomes:

1.Discuss the fundamentals of machining process.

2. Describe the overview of the lathe machine.
3. Explain the working principles of cutting machines like Shaping, Planning, Slotting, Drilling.
4. Classify the milling machines and explain the working principle.
5. Differentiate the finishing processes like grinding, lapping, honing and broaching.
6. Demonstrate jigs and Fixtures for simple parts and explain the working of CNC Machines.

UNIT I

FUNDAMENTALS OF MACHINING

Elementary treatment of metal cutting theory – element of cutting process – geometry of single point tool angles, chip formation and types of chips – built up edge and its effects chip breakers,mechanics of orthogonal cutting – Merchant's force diagram, cutting forces, cutting speeds, feed, depth of cut, tool life, coolants, tool materials.

UNIT II: LATHE MACHINES

Engine lathe – principle of working, specification of lathe – types of lathe – work holders tool holders – box tools taper turning, thread turning – for lathes and attachments, constructional features of speed gear box and feed gear box. Turret and capstan lathes – collet chucks – other work holders – tool holding devices – box and tool layout. Principal features of automatic lathes – classification – single spindle and multi-spindle automatic lathes – tool layout and cam design for automats.

UNIT III: SHAPING, SLOTTING AND PLANNING MACHINES

Principles of working – principal parts – specifications, operations performed, machining time calculations.

DRILLING & BORING MACHINES:

Principles of working, specifications, types, operations performed – tool holding devices – twist drill – Boring Machines – fine Boring Machines – jig boring machine, deep hole Drilling Machine.

UNIT IV: MILLING MACHINES

Principles of working – specifications – classification of Milling, Machines – Principle features of horizontal, vertical and universal Milling Machine, machining operations, types of cutters, geometry of milling cutters – methods of indexing, accessories to milling machines.

UNIT V: FINISHING PROCESSES

Theory of grinding – classification of grinding machines, cylindrical and surface grinding machines, tool and cutter grinding machines, different types of abrasives, bonds, specification and selection of a grinding wheel. Lapping, Honing & Broaching operations, comparison to grinding.

UNIT VI: JIGS & FIXTURES

Principles of design of jigs and fixtures and uses, classification of jigs & fixtures, principles of location and clamping, types of clamping & work holding devices, typical examples of jigs and fixtures.

CNC MACHINE TOOLS: CNC Machines, working principle, classification, constructional features of CNC machines, CNC controller, types of motion controls in CNC machines, applications of CNC machines.

Program Name: **Mechanical Engineering** Faculty Name: **M. MADHU SUDHANA RAO**

Class	Semester	Title of The Paper	Paper Code	W.E.F
III	I	DESIGN OF MACHINE MEMBERS-II	RT31033	19/11/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
85 Hours	Theory 6	Practical	3	Internal 30	External 70	3

PROGRAMME OUTCOMES:

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, 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.

PROGRAMME SPECIFIC OUTCOMES:

PSO1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

PSO2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

PSO3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices

COURSE OBJECTIVES:

- This course gives the insight of slider and roller bearings and the life prediction.
- Learn to design I.C engine parts
- Design the mechanical systems for power transmission elements such as gears, belts, ropes, chains, keys and levers

COURSE OUTCOMES:

1. Apply the knowledge to select the suitable bearing based on the application of the loads and predict the life of the bearing.

2. Design IC Engine parts.

3. Design curved beams and crane hooks.

4. Design power transmission elements such as belts, chains, pulleys, ropes and power screws.

5. Understand the gear tooth profiles, involute profile basics, Influence of number of teeth and pressure angle, Analysis of forces on spur, and helical gears. Bending and contact stress in gear tooth. Gear quality and selection aspects.

6. Design levers, brackets, crank pin and Wire Ropes.

COURSE CONTENT

UNIT – I BEARINGS: Classification of bearings- applications, types of journal bearings – lubrication – bearing modulus – full and partial bearings – clearance ratio – heat dissipation of bearings, bearing materials – journal bearing design – ball and roller bearings – static loading of ball & roller bearings, bearing life.

UNIT – II ENGINE PARTS: Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends – cranks and crank shafts, strength and proportions of over hung and center cranks – crank pins, crank shafts. Pistons, forces acting on piston – construction design and proportions of piston, cylinder, cylinder liners,

UNIT – III Design of curved beams: introduction, stresses in curved beams, expression for radius of neutral axis for rectangular, circular, trapezoidal and t-section, design of crane hooks, c –clamps.

UNIT – IV POWER TRANSMISSIONS SYSTEMS, PULLEYS: Transmission of power by belt and rope drives , transmission efficiencies, belts – flat and v types – ropes - pulleys for belt and rope drives, materials, chain drives DESIGN OF POWER SCREWS: Design of screw, square ACME, buttress screws, design of nut, compound screw, differential screw, ball screw- possible failures.

UNIT – V SPUR & HELICAL GEAR DRIVES: Spur gears- helical gears – load concentration factor – dynamic load factor, surface compressive strength – bending strength – design analysis of spur gears – estimation of centre distance, module and face width, check for plastic deformation, check for dynamic and wear considerations.

UNIT – VI MACHINE TOOL ELEMENTS: Levers and brackets: design of levers – hand levers-foot lever – cranked lever – lever of a lever loaded safety valve- rocker arm straight – angular- design of a crank

pin – brackets- hangers, wall boxes. Wire Ropes: Construction, Designation, Stresses in wire ropes, rope sheaves and drums.

Note: Design data book is permitted for examination

Text Books:

1. Machine Design/V.Bandari/TMH Publishers

2. Machine Design/ NC Pandya & CS Shaw/ Charotar publishers

3. Design data book.

References:

1. Machine Design: An integrated Approach / R.L. Norton / Pearson Education

2. Mech. Engg. Design / JE Shigley/Tata McGraw Hill education

3. Design of machine elements- spots/Pearson Publications

4. Machine Design-Norton/Pearson Publications

Program Name: **MECHANICAL** Faculty Name: **VIJAY SRIHARSHA TANGELLA**

Class	Semester	Title of The Paper	Paper Code	W.E.F
III	I	OPERATIONS RESEARCH	R1631034	20/06/2018

SYLLABUS

Total No. of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
	Theory	Practical		Internal	External	
70 Hours	5		3	30	70	3

PROGRAMME OUTCOMES:

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, 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.

PROGRAMME SPECIFIC OUTCOMES:

PSO 1: Ability to analyze and solve the problems in the domains of design, thermal and allied fields.

PSO 2: Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs.

PSO 3: Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

COURSE OBJECTIVES:

To learn the importance of Operations Research in the design, planning, scheduling, manufacturing and business applications and to use the various techniques of Operations Research in solving such problems.

COURSE OUTCOMES:

CO 1: Understand the concept of mathematical models such as formulation of linear Programming problems, Graphical Method and applying the optimization techniques like Simplex Method, Artificial variable – Big M method, Two-Phase Method and Duality.

CO 2: Analyzing and applying the general Mathematical model of transportation problem, assignment problem, travelling salesman problem, sequencing problem, replacement models etc. and their applications in Mechanical Engineering.

CO 3: Applying the replacement models etc. and their applications in Mechanical Engineering.

CO 4: Understand Game Theory and Queuing theory and their use and applications in Mechanical Engineering.

CO 5: Understand various inventory models and their applications.

CO 6: Understand different dynamic programming and simulation models and learn their applications in inventory and queuing problems.

COURSE CONTENT

UNIT I:

Development – definition– characteristics and phases – types of operation research models – applications.

ALLOCATION: Linear programming problem formulation – graphical solution – simplex method – artificial variables techniques -two–phase method, big-M method – duality principle.

UNIT II:

TRANSPORTATION PROBLEM: Formulation – optimal solution, unbalanced transportation problem – degeneracy, assignment problem – formulation – optimal solution - variants of assignment problem- traveling salesman problem.

SEQUENCING – Introduction – flow **–**shop sequencing – *n* jobs through two machines – *n* jobs through three machines – job shop sequencing – two jobs through 'm' machines.

UNIT III:

REPLACEMENT: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.

UNIT IV:

THEORY OF GAMES: Introduction – mini. max (max. mini) – criterion and optimal strategy – solution of games with saddle points – rectangular games without saddle points – 2 x 2 games – dominance principle – m x 2 & 2 x n games -graphical method.

WAITING LINES: Introduction – single channel – poison arrivals – exponential service times – with infinite population and finite population models– multichannel – poison arrivals – exponential service times with infinite population single channel poison arrivals.

UNIT V:

INVENTORY : Introduction – single item – deterministic models – purchase inventory models with one price break and multiple price breaks – shortages are not allowed – stochastic models – demand may be discrete variable or continuous variable – instantaneous production. Instantaneous demand and continuous demand and no set up cost. ABC & VED Analysis.

UNIT VI:

DYNAMIC PROGRAMMING: Introduction – Bellman's principle of optimality – applications of dynamic programming- capital budgeting problem – shortest path problem – linear programming problem.

SIMULATION: Definition – types of simulation models – phases of simulation– applications of simulation – inventory and queuing problems – advantages and disadvantages – simulation languages.

Program Name: MECHANICAL-A&B Faculty Name: D.PRASAD

Class	Semester	Title of The Paper	Paper Code	W.E.F
III	I	THERMAL ENGINEERING-II	R1631035	12/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
73 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.
PSO2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs
PSO3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

This course is intended to provide basic knowledge of components being used in steam and gas power plant cycles.
To analyse the energy transfers and transformations in these components including individual Performance evaluation.

Course Outcomes:

- **CO 1:** Analyze the perfermance of Steam power plant.
- **CO 2:** Understand Classification of Boilers & Performance of Boilers.
- **CO 3:** Evaluate the stem turbines.
- **CO 4:** Classify & Applications the Steam Condensers.
- **CO 5:** Evaluate the performance of Gas Turbines.
- **CO 6:** Understand & Working of various Jet Propulsion units.

UNIT – I
BASIC CONCEPTS: Rankine cycle - schematic layout, thermodynamic analysis, concept of mean temperature of heat addition, methods to improve cycle performance – regeneration & reheating. combustion: fuels and combustion, concepts of heat of reaction, adiabatic flame temperature, Stoichiometry, flue gas analysis.
UNIT II
BOILERS : Classification – working principles of L.P & H.P boilers with sketches – mountings and accessories – working principles, boiler horse power, equivalent evaporation, efficiency and heat balance – draught, classification – height of chimney for given draught and discharge, condition for maximum discharge, efficiency of chimney – artificial draught, induced and forced.
UNIT – III
STEAM NOZZLES: Function of a nozzle – applications - types, flow through nozzles, thermodynamic analysis – assumptions -velocity of fluid at nozzle exit-Ideal and actual expansion in a nozzle, velocity coefficient, condition for maximum discharge, critical pressure ratio, criteria to decide nozzle shape: Super saturated flow, its effects, degree of super saturation and degree of under cooling - Wilson line.

STEAM TURBINES: Classification – impulse turbine; mechanical details – velocity diagram – effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency. De-laval turbine - methods to reduce rotor speed-velocity compounding, pressure compounding and velocity & pressure compounding, velocity and pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine, condition for maximum efficiency

UNIT IV

REACTION TURBINE: Mechanical details – principle of operation, thermodynamic analysis of a stage, degree of reaction –velocity diagram – Parson's reaction turbine – condition for maximum efficiency – calculation of blade height.

STEAM CONDENSERS: Requirements of steam condensing plant – classification of condensers – working principle of different types – vacuum efficiency and condenser efficiency – air leakage, sources and its affects, air pump- cooling water requirement.

UNIT – V

GAS TURBINES: Simple gas turbine plant – ideal cycle, essential components – parameters of performance – actual cycle – regeneration, inter cooling and reheating –closed and semi-closed cycles – merits and demerits, types of combustion chambers

UNIT – VI

JET PROPULSION : Principle of operation –classification of jet propulsive engines – working principles with schematic diagrams and representation on t-s diagram - thrust, thrust power and propulsion efficiency – turbo jet engines – needs and demands met by turbo jet – schematic diagram, thermodynamic cycle, performance evaluation, thrust augmentation – methods.

Rockets : Application – working principle – classification – propellant type – thrust, propulsive efficiency – specific impulse – solid and liquid propellant rocket engines.

Text Books:

1. Thermodynamics and Heat Engines/R.Yadav, Volume -II /Central Publishing House
2. Gas Turbines /V.Ganesan /TMH
3. Heat Engineering /V.P Vasandani and D.S Kumar/Metropolitan Book Company, New Delhi

References:

1. Gas Turbines and Propulsive Systems /P.Khajuria & S.P.Dubey /Dhanpatrai
2. Gas Turbines / Cohen, Rogers and Saravana Muttoo / Addison Wesley – Longman
3. Thermal Engineering-R.S Khurmi, &J S Gupta/S.Chand.
4. Thermal Engineering-P.L.Bellaney/ Khanna publishers.
5. Thermal Engineering-M.L.Marthur & Mehta/Jain bros. Publishers
6. Thermal Engineering / RK Rajput/ Lakshmi Publications

Program Name: MECHANICAL-A&B Faculty Name: D.PRASAD

Class	Semester	Title of The Paper	Paper Code	W.E.F
III	I	THERMAL ENGINEERING LAB	R1631038L	11/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester External Lab Examination in Hours	Max Marks		Credits
45 Hours	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.
PSO2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs
PSO3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

To provide hands on experience in operating various types of internal combustion Engines and understand their functioning and performance.

Course Outcomes:

CO 1: To Understand the working and performance of IC Engine.

Syllabus:

1. I.C. Engines valve / port timing diagrams.
2. Testing of Fuels – Viscosity, flash point/fire point, carbon residue, calorific value.
3. I.C. Engines performance test and Exhaust emission measurements (4 -stroke diesel engine)
4. I.C. Engines performance test and Exhaust emission measurements (2-stroke petrol engine)
5. Evaluation of engine friction by conducting Morse test on 4-stroke multi cylinder petrol engine.
6. Determination of FP by retardation and motoring test on IC engine.
7. I.C. Engines heat balance at different loads and show the heat distribution curve.
8. Economical speed test of an IC engine.
9. Performance test on variable compression ratio engines.
10. Performance test on reciprocating air compressor unit.
11. Dis-assembly / assembly of different parts of two wheelers. 3 wheelers & 4 wheelers. Tractor & Heavy duty engines covering 2-stroke and 4 stroke, SI and CI engines.
12. Study of boilers, mountings and accessories

Program Name: Mechanical Faculty Name: A.V.A.R Durga Rao

Class	Semester	Title of The Paper	Paper Code	W.E.F
III	I	Machine Tools Laboratory	R1631037	11/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
33 Hours	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

4. Ability to apply the acquired Mechanical Engineering knowledge to solve engineering problems utilizing advanced technology for the advancement of society and oneself with confidence.
5. Successfully apply the principles of drafting and design, to analyze and evaluate using tools to solve real time problems of structural, thermal and allied field problems resulting in significant societal development.
6. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices and to become responsible citizens with ethical values

Course Objectives:

- To understand the parts of various machine tools and operate them. They are required to understand the different shapes of products that can be produced on these machine tools.

Course Outcomes:

- Understand the operating principles of different machine tools using different work holders to produce different part features to the desired quality.

LATHE MACHINES:

1. Step turning and taper turning.
2. Thread cutting and knurling.

DRILLING:

1. Drilling and Tapping

SHAPING AND SLOTTING:

1. Shaping operation.
2. Slotting operation.

MILLING:

1. Milling Machine operation

GRINDING:

1. Flat surface grinding operation

Program Name: Mechanical Engineering Faculty Name: A.K.CHAITANYA

Class	Semester	Title of The Paper	Paper Code	W.E.F
III	II	INSTRUMENTATION &CONTROL SYSTEMS	RT32034	19/11/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
80 Hours	Theory 5	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.
PSO2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs
PSO3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices

Course Objectives:

- Understand the concept of transducers.
- Recall the various methods of temperature and pressure measurement systems.
- Understand the concept of flow ,velocity , level and vibration measurement systems and various transducers to measure them.
- Discuss the different methods used to measure stress and strain.
- Understand the different techniques used to measure the Humidity, power and torque measurement systems.
- Understand open loop and closed loop control systems and servomechanisms ,able to draw block diagrams for temperature , speed and position control systems.

Course Outcomes:

7. Develop the knowledge of basic principles of measurement.
8. Understand the concepts of Temperature and pressure measurements.
9. Able to understand the working principles of different devices used for the speed, flow and level measurement.
10. Develop the knowledge on Stress-strain measurement.
11. Able to select appropriate device for the measurement of parameters like humidity, torque and power etc.,and justify its use through characteristics and performance.
12. Demonstrate the knowledge on open& closed loop systems.

Course Content

UNIT – I

Definition – Basic principles of measurement – measurement systems, generalized configuration and functional descriptions of measuring instruments – examples. dynamic performance characteristics – sources of error, classification and elimination of error. Measurement of Displacement: Theory and construction of various transducers to measure displacement – piezo electric, inductive, capacitance, resistance, ionization and photo electric transducers, calibration procedures.

UNIT – II

MEASUREMENT OF TEMPERATURE: Classification – ranges – various principles of measurement – expansion, electrical resistance – thermistor – thermocouple – pyrometers – temperature indicators.

MEASUREMENT OF PRESSURE: Units – classification – different principles used. manometers, piston, bourdon pressure gauges, bellows – diaphragm gauges. low pressure measurement – thermal conductivity gauges – ionization pressure gauges, mcleod pressure gauge

UNIT – III

MEASUREMENT OF LEVEL : Direct method – indirect methods – capacitative, ultrasonic, magnetic, cryogenic fuel level indicators – bubler level indicators.

FLOW MEASUREMENT: Rotameter, magnetic, ultrasonic, turbine flow meter, hot – wire anemometer, laser doppler anemometer (LDA).

MEASUREMENT OF SPEED : Mechanical tachometers – electrical tachometers – stroboscope, noncontact type of tachometer Measurement of Acceleration and Vibration: Different simple instruments – principles of seismic instruments – vibrometer and accelerometer using this principle.

UNIT – IV

STRESS STRAIN MEASUREMENTS : Various types of stress and strain measurements – electrical strain gauge – gauge factor – method of usage of resistance strain gauge for bending compressive and tensile strains – usage for measuring torque, strain gauge rosettes.

UNIT – V

MEASUREMENT OF HUMIDITY – Moisture content of gases, sling psychrometer, absorption psychrometer, dew point meter.

MEASUREMENT OF FORCE, TORQUE AND POWER- Elastic force meters, load cells, torsion meters, dynamometers.

UNIT – VI

ELEMENTS OF CONTROL SYSTEMS : Introduction, importance , classification , open and closed systems, servomechanisms,examples with block diagrams–temperature, speed & position control systems.

Textbooks /References (in IEEE format):

Text books:

1. Measurement Systems: Applications & design by D.S Kumar.
2. Mechanical Measurements / BeckWith, Marangoni,Linehard, PHI / PE.

References:

1. Measurement systems: Application and design, Doeblin Earnest. O. Adaptation by Manik and Dhanesh/ TMH.
2. Experimental Methods for Engineers / Holman.
3. Mechanical and Industrial Measurements / R.K. Jain/ Khanna Publishers.
4. Instrumentation, measurement & analysis by B.C.Nakra & K.K.Choudhary, TMH

Program Name: Mechanical Faculty Name: A.V.A.R Durga Rao

Class	Semester	Title of The Paper	Paper Code	W.E.F
III	II	Metrology	R1632031	19/11/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
81 Hours	Theory 4	Practical	3	Internal 30	External 70	4

Programme Outcomes:

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, 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.

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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.

Programme Specific Outcomes:

7. Ability to apply the acquired Mechanical Engineering knowledge to solve engineering problems utilizing advanced technology for the advancement of society and oneself with confidence.
8. Successfully apply the principles of drafting and design, to analyze and evaluate using tools to solve real time problems of structural, thermal and allied field problems resulting in significant societal development.
9. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices and to become responsible citizens with ethical values.

Course Objectives:

1. Inspection of engineering parts with various precision instruments
2. Design of part, tolerances and fits
3. Principles of measuring instruments and gauges and their uses
4. Evaluation and inspection of surface roughness
5. Inspection of spur gear and thread elements
6. Machine tool testing to evaluate machine tool quality

Course Outcomes:

13. Explain the fundamentals of limits, fits, tolerances and allowances.
14. Identify the uses of gauges and different type of measurement processes.
15. Understand the operation of interferometer and optical measuring instrument systems.
16. Discuss the different surface finish measurements and uses of comparators.
17. Understand the significance of measurement system, errors and transducers intermediate modifying and terminating devices.
18. Explain the working principle of different machine tool alignment tests.

UNIT-I

SYSTEMS OF LIMITS AND FITS: Introduction, nominal size, tolerance, limits, deviations, fits – Unilateral and bilateral tolerance system, hole and shaft basis systems- interchangeability, determistic & statistical tolerances, selective assembly. International standard system of tolerances, selection of limits and tolerances for correct functioning.

UNIT-II

LINEAR MEASUREMENT: Length standards, end standards, slip gauges- calibration of the slip gauges, dial indicators, micrometers.

MEASUREMENT OF ANGLES AND TAPERS:

Different methods – bevel protractor, angle slip gauges- angle dekkor- spirit levels- sine bar- sine table, rollers and spheres used to measure angles and tapers.

LIMIT GAUGES:
Taylor's principle – design of go and no go gauges; plug, ring, snap, gap, taper, profile and position gauges.

UNIT-III

OPTICAL MEASURING INSTRUMENTS: Tools maker's microscope and uses - autocollimators, optical projector, optical flats and their uses.
INTERFEROMETRY:
Interference of light, Michelson's interferometer, NPL flatness interferometer, and NPL gauge interferometer.

UNIT-IV

SURFACE ROUGHNESS MEASUREMENT: Differences between surface roughness and surface waviness – Numerical assessment of surface finish-CLA, Rt., R.M.S. Rz, R10 values, Method of measurement of surface finish – Profilograph, Talysurf, ISI symbols for indication of surface finish.

COMPARATORS: Types - mechanical, optical , electrical and electronic, pneumatic comparators and their uses.

UNIT – V

GEAR MEASUREMENT: Nomenclature of gear tooth, tooth thickness measurement with gear tooth vernier & flange micro meter, pitch measurement, total composite error and tooth to tooth composite errors, rolling gear tester, involute profile checking.
SCREW THREAD MEASUREMENT: Elements of measurement – errors in screw threads- concept of virtual effective diameter, measurement of effective diameter, angle of thread and thread pitch, and profile thread gauges.

UNIT – VI

FLATNESS MEASUREMENT:
Measurement of flatness of surfaces- instruments used- straight edges- surface plates – auto collimator.
MACHINE TOOL ALIGNMENT TESTS: Principles of machine tool alignment testing on lathe, drilling and milling machines.

Program Name: MECH Faculty Name: E. Rama Krishna Reddy

Class	Semester	Title of The Paper	Paper Code	W.E.F
III	II	Refrigeration & Air Conditioning		11/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
80 Hours	Theory 5	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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.

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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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs.

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

1. The course is to understand the basic cycles of various refrigerating systems, their performance evaluation along with details of system components and refrigerant properties.
2. The course is also aimed at imparting knowledge of psychrometric properties, processes which are used in air-conditioning systems for comfort and industrial applications.

Course Outcomes:

1. Illustrate the basic concepts of refrigeration system.
2. Analyze the vapour compression cycle and interpret the usage of refrigerants.
3. Explain the components of vapour compression system.
4. Demonstrate the use of psychrometry in analyzing refrigeration systems.
5. Use P-h, T-S and Psychrometric charts to solve refrigeration and Air conditioning
Design problems
6. Discuss the theory and concept of air-conditioning systems

UNIT – I

INTRODUCTION TO REFRIGERATION: Necessity and applications – unit of refrigeration and C.O.P. –Mechanical refrigeration – types of ideal cycles of refrigeration. air refrigeration: bell coleman cycle - open and dense air systems – refrigeration systems used in air crafts and problems.

UNIT – II

VAPOUR COMPRESSION REFRIGERATION: Working principle and essential components of the plant –simple vapour compression refrigeration cycle – COP – representation of cycle on T-S and p-h charts – effect of sub cooling and super heating – cycle analysis – actual cycle influence of various parameters on system performance – use of p-h charts – numerical problems.

UNIT III

REFRIGERANTS – Desirable properties – classification - refrigerants used – nomenclature – ozone depletion –global warming

VCR SYSTEM COMPONENTS: Compressors – general classification – comparison – advantages and disadvantages. condensers – classification – working principles evaporators – classification – working principles expansion devices – types – working principles

UNIT IV

VAPOR ABSORPTION SYSTEM: Calculation of maximum COP – description and working of NH_3 – water system and Li Br –water (Two shell & Four shell) System, principle of operation three fluid absorption system, salient features.

STEAM JET REFRIGERATION SYSTEM: Working Principle and basic components. principle and operation of (i) thermoelectric refrigerator (ii) vortex tube.

UNIT – V

INTRODUCTION TO AIR CONDITIONING: Psychometric properties & processes – characterization of sensible and latent heat loads — need for ventilation, consideration of infiltration – load concepts of RSHF, GSHF- problems, concept of ESHF and ADP temperature. Requirements of human comfort and concept of effective temperature- comfort chart –comfort air conditioning –requirements of industrial air conditioning, air conditioning load calculations.

UNIT – VI

AIR CONDITIONING SYSTEMS: Classification of equipment, cooling, heating humidification and Dehumidification, filters, grills and registers fans and blowers. Heat pump – heat sources – different heat pump circuits.

Program Name: CIVI Faculty Name: V.G.Priyanka

Class	Semester	Title of The Paper	Paper Code	W.E.F
III	II	Industrial Robotics		19/11/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
65 Hours	Theory 5	Practical	3	Internal 30	External 70	3

Programme Outcomes:

PO1.**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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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.

Programme Specific Outcomes:

1. To introduce fundamental concepts in robotics on manipulators, arm configurations

2.Kinematic and Dynamic applications of Robot.

Course Objectives:

- The students completing this course are expected to understand the concepts of robot dynamics ,kinematics,trajectory planning,and functioning of different types of sensors used in robot,exploring modern and future applications of robot.

Course Outcomes:

1. To introduce fundamental concepts in robotics on manipulators, arm configurations , co-ordinate frames,applications.
2. To familiarize the student with the various components of industrial robotics.
3. To make the students to calculate the forward kinematics and inverse kinematics of serial and parallel robots
4. To make the student learn to calculate the Jacobian for serial and parallel robot
5. To make students learn trajectory planning , software packages for a robotic system.
6. To make students learn and understand the functioning of sensors and actuators. Explore future and modern applications of robotics.

UNIT-I INTRODUCTION:

Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system.

UNIT – II

COMPONENTS OF THE INDUSTRIAL ROBOTICS:

Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT – III

MOTION ANALYSIS: Homogeneous transformations as applicable to rotation and translation –problems.

MANIPULATOR KINEMATICS: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT – III

MOTION ANALYSIS: Homogeneous transformations as applicable to rotation and translation – problems.

MANIPULATOR KINEMATICS: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT – IV

Differential transformation and manipulators, Jacobians – problems Dynamics: Lagrange – Euler and Newton – Euler formulations – Problems.

UNIT V

General considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint Mechanical Engineering 122 integrated motion –straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language..

UNIT VI

ROBOT ACTUATORS AND FEED BACK COMPONENTS: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors. Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

ROBOT APPLICATIONS IN MANUFACTURING: Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOKS:

1. Industrial Robotics / Groover M P /Pearson Edu.

2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

Program Name: MECHANICAL-A&B Faculty Name: D.PRASAD

Class	Semester	Title of The Paper	Paper Code	W.E.F
III	II	HEAT TRANSFER	R1632035	19/11/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
75 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

PO1.**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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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.

Programme Specific Outcomes:

PSO1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

PSO2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs

PSO3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

- The course provides students with fundamental knowledge and Difference of Thermodynamics & Heat transfer
- In this course, the students able to application of Fins and unsteady state heat transfer through metals or bodies
- To demonstrate the fundamentals convection mode of heat transfer.
- To develop knowledge of types of convection heat transfer on different types
- To understand& analyze the heat exchange process in various types
- To apply knowledge of radiation mode of heat transfer & application

Course Outcomes:

- **CO 1:** Explain the fundamental concepts and main ideas of modes Heat Transfer.
- **CO 2:** Demonstrate and analysis of fins and the fundamental concept of transient heat transfer mechanism
- **CO 3:** Fundamental concept of convection mode of heat transfer and dimensional analysis
- **CO 4:** Explain and analysis on different convection mechanisms
- **CO 5:** Demonstrate and analysis of different types of Heat exchangers
- **CO 6:** Explain the fundamental concepts of radiation mode of heat transfer and applications

Syllabus:

- **UNIT – I**

INTRODUCTION&MODES TO HEAT TRANSFER:

INTRODUCTION: Modes and mechanisms of heat transfer – basic laws of heat transfer –General discussion about applications of heat transfer.

CONDUCTION HEAT TRANSFER: Fourier rate equation – general heat conduction equation in Cartesian, cylindrical and Spherical coordinates. Steady, unsteady and periodic heat transfer – initial and boundary conditions. ONE DIMENSIONAL STEADY STATE CONDUCTION HEAT TRANSFER: Homogeneous slabs, hollow cylinders and spheres – overall heat transfer coefficient – electrical analogy – critical radius of insulation- Variable thermal conductivity – systems with heat sources or heat generation.

- **UNIT – II**

  FINS&TRANSIENT HEAT CONDUCTION:

  extended surface (fins) heat Transfer – long fin, fin with insulated tip and short fin, application to error measurement of temperature.

  ONE DIMENSIONAL TRANSIENT CONDUCTION HEAT TRANSFER: Systems with negligible internal resistance – significance of biot and fourier numbers - chart solutions of transient conduction systems.
- **UNIT – III**

  CONVECTIVE HEAT TRANSFER:

  Classification of convective heat transfer – dimensional analysis as a tool for experimental investigation –Buckingham Pi Theorem for forced and free convection, application for

  developing semi – empirical non- dimensional correlation for convective heat transfer – Significance of non-dimensional numbers – concepts of continuity, momentum and Energy Equations.
- UNIT – IV

  FORCED CONVECTION& FREE CONVECTION

  EXTERNAL FLOWS: Concepts about hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer -flat plates and cylinders.

  INTERNAL FLOWS: Concepts about hydrodynamic and thermal entry lengths – division of internal flow based on this –use of empirical relations for horizontal pipe flow and annulus flow.

  FREE CONVECTION: Development of hydrodynamic and thermal boundary layer along a vertical plate – use of empirical relations for vertical plates and pipes.
- UNIT –V

  HEAT TRANSFER WITH PHASE CHANGE

  BOILING: Pool boiling – regimes- calculations on nucleate boiling, critical heat flux and film boiling.

  CONDENSATION: Film wise and drop wise condensation –nusselt's theory of condensation on a vertical plate - film condensation on vertical and horizontal cylinders using empirical correlations.

  HEAT EXCHANGERS:

  Classification of heat exchangers – overall heat transfer coefficient and fouling factor – concepts of LMTD and NTU methods – Problems.
- UNIT - VI

  RADIATION HEAT TRANSFER:

  Emission characteristics and laws of black-body radiation – Irradiation – total and monochromatic quantities – laws of Planck, Wien, Kirchoff, Lambert, Stefan and Boltzmann– heat exchange between two black bodies – concepts of shape factor – Emissivity – heat exchange between grey bodies – radiation shields – electrical analogy for radiation networks.
- TEXT BOOKS:
- TEXT BOOKS:

  1. Heat Transfer - HOLMAN/TMH
  2. Heat Transfer – P.K.Nag/ TMH
  3. Principles of Heat Transfer – Frank Kreith, RM Manglik & MS Bohn, Cengage learning publishers.

  REFERENCE BOOKS:

  1. Heat and Mass Transfer – Arora and Domkundwar, Dhanpatrai & sons.
  2. Fundamentals of Engg. Heat and Mass Transfer / R.C.SACHDEVA / New Age International.
  3. Heat and Mass Transfer –Cengel- McGraw Hill.
  4. Heat and Mass Transfer – D.S.Kumar / S.K.Kataria & Sons.

Program Name: mechanical engineering Faculty Name: V.Chandrika

Class	Semester	Title of The Paper	Paper Code	W.E.F
III	II	HT LAB		19/11/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
30	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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.

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Programme Specific Outcomes:

PSO1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.
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Course Objectives:

The laboratory course is aimed to provide the practical exposure to the students with regard to the determination of amount of heat exchange in various modes of heat transfer including condensation & boiling for several geometries

Course Outcomes:

evaluate the amount of heat exchange for plane, cylindrical & spherical geometries and should be able to compare the performance of extended surfaces and heat exchangers

LIST OF EXPERIMENTS

1. COP of VCR System with Capillary and thermal expansion valve.
2. Determination of overall heat transfer co-efficient of a composite slab
3. Determination of heat transfer rate through a lagged pipe.
4. Determination of heat transfer rate through a concentric sphere
5. Determination of thermal conductivity of a metal rod.
6. Determination of efficiency of a pin-fin
7. Determination of heat transfer coefficient in natural and forced convection
8. Determination of effectiveness of parallel and counter flow heat exchangers.
9. Determination of emissivity of a given surface.
10. Determination of Stefan Boltzman constant.
11. Determination of heat transfer rate in drop and film wise condensation.
12. Determination of critical heat flux.
13. Determination of Thermal conductivity of liquids and gases.
14. Investigation of Lambert's cosine law.

Program Name: Mechanical Faculty Name: A.V.A.R Durga Rao

Class	Semester	Title of The Paper	Paper Code	W.E.F
III	II	Metrology and Instrumentation Laboratory	R1632036	19/11/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
39 Hours	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

10. Ability to apply the acquired Mechanical Engineering knowledge to solve engineering problems utilizing advanced technology for the advancement of society and oneself with confidence.
11. Successfully apply the principles of drafting and design, to analyze and evaluate using tools to solve real time problems of structural, thermal and allied field problems resulting in significant societal development.
12. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices and to become responsible citizens with ethical values

Course Objectives:

- To Illustrate the use of various measuring devices and gauging instruments for inspection of precision linear, geometric forms, angular and surface finish measurements.

Course Outcomes:

- Understand the different instruments that are available for linear, angular, roundness and roughness measurements they will be able to select and use the appropriate measuring instrument according to a specific requirement (in terms of accuracy, etc).

METROLOGY LAB:

1. Measurement of lengths, heights, diameters by vernier calipers, micrometers etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear tooth vernier caliper for tooth thickness inspection and flange micro meter for checking the chordal thickness of spur gear.
4. Machine tool alignment test on the lathe.
5. Machine tool alignment test on drilling machine.
6. Machine tool alignment test on milling machine.
7. Angle and taper measurements with bevel protractor, Sine bar, rollers and balls.
8. Use of spirit level in finding the straightness of a bed and flatness of a surface.
9. Thread inspection with two wire/ three wire method & tool makers microscope.
10. Surface roughness measurement with roughness measuring instrument.

INSTRUMENTATION LAB

1. Calibration of pressure gauge.
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
4. Calibration of strain gauge.

5. Calibration of thermocouple.
6. Calibration of capacitive transducer.
7. Study and calibration of photo and magnetic speed pickups.
8. Calibration of resistance temperature detector.
9. Study and calibration of a rotameter.
10. Study and use of a seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.
11. Study and calibration of Mcleod gauge for low pressure.

Program Name: MECHANICAL Faculty Name: Ch.Saraswathi

Class	Semester	Title of The Paper	Paper Code	W.E.F
IV	I	Unconventional machining process	RT41034	11/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
70 Hours	Theory 12	Practical 6	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1	Ability to apply the acquired Mechanical Engineering knowledge to solve engineering problems utilizing advanced technology for the advancement of society and oneself with confidence.
Selected as the course provides skills required to learn effectively for performing various machining process.	
PSO2	Successfully apply the principles of drafting and design, to analyze and evaluate using tools to solve real time problems of structural, thermal and allied field problems resulting in significant societal development
Selected as the course is used to analyse and solve real time problems.	
PSO3	Develop and implement new ideas by using robotics and mechatronics with the help of modern CAD/CAM tools, while ensuring best manufacturing practices.
Not selected as the course does not related.	

Course Objectives:

- The course aims in identifying the classification of unconventional Machining processes.
- To understand the principle, mechanism of metal removal of various Unconventional machining processes.
- To study the various process parameters and their effect on the Component machined on various unconventional machining processes.
- To understand the applications of different process.

Course Outcomes:

- Explain the importance of unconventional machining process and also discuss ultrasonic Machining process.
- Describe the process of electro chemical machining, electrochemical grinding, and electro chemical honing.
- Discuss briefly thermal metal removal process
- Explain the principle and working of electron beam machining and laser beam machine process.

- ❖ Explain the principle & working of plasma arc machining process.
- ❖ Explain the working & principle of abrasive jet machining, water jet machining, abrasive water jet machining and also explain mechanism of material removal in various machining process.

UNIT I

INTRODUCTION: Need for non-traditional machining methods classification Of modern machining processes – considerations in process selection, applications.

Ultrasonic machining – Elements of the process, mechanics of material Removal, MRR process parameters, economic considerations, applications and limitations.

UNIT-II

ELECTRO – CHEMICAL MACHINING: Fundamentals of electro Chemical machining, electrochemical grinding, electro chemical honing and Deburring process, metal removal rate in ECM, Tool design, Surface finish And accuracy, economic aspects of ECM – Simple problems for estimation of Metal removal rate, fundamentals of chemical, machining, advantages and Applications.

UNIT-III

THERMAL METAL REMOVAL PROCESSES: General principle and Applications of Electric Discharge Machining, Electric Discharge Grinding And wire EDM – Power circuits for EDM, Mechanics of metal removal in EDM, Process parameters, selection of tool electrode and dielectric fluids, Surface finish and machining accuracy, characteristics of spark eroded Surface.

UNIT-IV

Electron Beam Machining, Laser Beam Machining - Basic principle and Theory, mechanics of material removal, process parameters, efficiency & Accuracy, applications

UNIT-V

Plasma Machining: Application of plasma for machining, metal removal Mechanism, process parameters, accuracy and surface finish and other Applications of plasma in manufacturing industries.

UNIT-VI

Abrasive jet machining, Water jet machining and abrasive water jet Machining: Basic principles, equipments, process variables, mechanics of Material removal, MRR, application and limitations. Magnetic abrasive finishing, abrasive flow finishing, Electro stream drilling, Shaped tube electrolytic machining.

Program Name: MECHANCIAL Faculty Name: K.Girish Kumar

Class	Semester	Title of The Paper	Paper Code	W.E.F
IV	I	Automobile Engineering	RT41031	18/6/18

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
80 Hours	Theory 5	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to analyses and solve the problems in the domains of design, thermal and allied fields.

2 Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs**.**

3 Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

❖ The course imparts the principles of automobile systems and provides the salient features of safety, emission and service of automobiles.

Course Outcomes:

1. Classify basic components of an automobile.
2. Select transmission system for a given vehicle.
3. Summarize steering systems used in automobile.
4. Understand braking and suspension systems.
5. Describe the safety systems employed in a automobile.
6. Understand engine service and emission control.

Course Content

UNIT – I

INTRODUCTION: Components of four wheeler automobile – chassis and body – power unit – power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarbonisation, Nitriding of crank shaft.

UNIT – II

TRANSMISSION SYSTEM: Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box, over drive torque converter. propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential rear axles – types – wheels and tyres.

UNIT – III

STEERING SYSTEM: Steering geometry – camber, castor, king pin rake, combined angle toein, center point steering. types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears –

types, steering linkages.
UNIT – IV
SUSPENSION SYSTEM: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspensionsystem.
BRAKING SYSTEM: Mechanical brake system, hydraulic brake system, master cylinder, wheel cylinder tandem master cylinder requirement of brake fluid, pneumatic and vacuum brakes.
ELECTRICAL SYSTEM: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting
Mechanical Engineering 140systems, horn, wiper, fuel gauge – oil pressure gauge, engine temperatureindicator etc.
UNIT – V
ENGINE SPECIFICATION AND SAFETY SYSTEMS: Introductionengine specifications with regard to power, speed, torque, no. of cylindersand arrangement, lubrication and cooling etc.Safety: Introduction, safety systems - seat belt, air bags, bumper, anti lockbrake system (ABS), wind shield, suspension sensors, traction control,mirrors, central locking and electric windows, speed control.
UNIT – VI
ENGINE EMISSION CONTROL: Introduction – types of pollutants,mechanism of formation, concentration measurement, methods of controlling-engine modification, exhaust gas treatment-thermal and catalyticconverters-use of alternative fuels for emission control – National and International pollution standards.
ENGINE SERVICE: Introduction, service details of engine cylinder head, valves and valve mechanism, piston-connecting rod assembly, cylinder block, crank shaft and main bearings, engine reassembly-precautions.
TEXT BOOKS:
1. Automotive Mechanics – Vol. 1 & Vol. 2 / Kripal Sing, standard publishers.
2. Automobile Engineering / William Crouse, TMH Distributors .
3. Automobile Engineering- P.S Gill, S.K. Kataria & Sons, New Delhi.
REFERENCES:
1. Automotive Engines Theory and Servicing, James D. Halderman and Chase D. Mitchell Jr., Pearson education inc.
2. Automotive Engineering / Newton Steeds & Garrett.
3. Automotive Mechanics / Heitner.

Program Name: Mechanical Engineering Faculty Name: D KISHORE BABU

Class	Semester	Title of The Paper	Paper Code	W.E.F
IV	I	FINITE ELEMENT METHODS	RT41033	10/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
80 Hours	Theory 5	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.
PSO2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs
PSO3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices

Course Learning Objectives:

- To learn basic principles of finite element analysis procedure .
- To learn the theory and characteristics of finite elements that represent engineering structures.
- To learn and apply finite element solutions to structural, thermal, dynamic problem to develop the knowledge and skills needed to effectively evaluate finite element analyses performed by others.
- Learn to model complex geometry problems and solution techniques.

Course Outcomes:

1. Understand the concepts behind variational methods and weighted residual methods in FEM.
2. Understand the Discretization procedures, element shapes node numbering schemes, assembly of stiffness matrix in FEM and treatments of boundary conditions
3. Identify the application and characteristics of FEA elements such as trusses, beams.
4. Analysis of constant strain triangles and formulation of axis symmetric problems.
5. Apply finite element analysis to higher order and isoparametric elements.
6. Able to identify how the finite element method expands beyond the structural domain, for problems involving dynamics, heat transfer, and evaluation of eigen values and eigen vectors.

Course Content

UNIT-I

Introduction to finite element method, stress and equilibrium, strain – displacement relations, stress – strain relations, plane stress and plane strain conditions, variational and weighted residual methods, concept of potential energy, one dimensional problems.

UNIT – II

Discretization of domain, element shapes, discretization procedures, assembly of stiffness matrix, band width, node numbering, mesh generation, interpolation functions, local and global coordinates, convergence requirements, treatment of boundary conditions.

UNIT – III

Analysis of Trusses: Finite element modeling, coordinates and shape functions, assembly of global stiffness matrix and load vector, finite element equations, treatment of boundary conditions, stress, strain and support reaction calculations. Analysis of Beams: Element stiffness matrix for Hermite beam element, derivation of load vector for concentrated and UDL, simple problems on beams.

UNIT – IV

Finite element modeling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions, formulation of axis symmetric problems.

UNIT-V

Higher order and isoparametric elements: One dimensional quadratic and cubic Mechanical Engineering 144 elements in natural coordinates, two dimensional four noded isoparametric elements and numerical integration.

UNIT – VI

Steady state heat transfer analysis : one dimensional analysis of a fin and two dimensional analysis of thin plate, analysis of a uniform shaft subjected to torsion. Dynamic Analysis: Formulation of finite element model, element consistent and lumped mass matrices, evaluation of eigen values and eigen vectors, free vibration analysis.

TEXT BOOKS:

1. Introduction to Finite Elements in Engineering / Chandraputla, Ashok and Belegundu / Prentice – Hall.

2. The Finite Element Methods in Engineering / SS Rao / Pergamon.

REFERENCES:

1. Finite Element Method with applications in Engineering / YM Desai, Eldho & Shah /Pearson publishers.
2. An introduction to Finite Element Method / JN Reddy / McGrawHill.
3. The Finite Element Method for Engineers – Kenneth H. Huebner, Donald L. Dewhirst, Douglas E. Smith and Ted G. Byrom / John Wiley & sons (ASIA) Pte Ltd.
4. Finite Element Analysis: Theory and Application with Ansys, Saeed Moaveniu, Pearson Education.

Program Name: MECH Faculty Name: E. Rama Krishna Reddy

Class	Semester	Title of The Paper	Paper Code	W.E.F
IV	I	Design for manufacture	RT41038	11/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
80 Hours	Theory 5	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs.

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:
1. Understand the design rules and considerations with reference to various manufacturing processes.
2. To discusses capabilities and limitations of each manufacturing process in relation to part design and cost.
3. To examine DFM principles including how the design affects manufacturing cost, lean manufacturing, six sigma, etc.

Course Outcomes:

1. Understand the design rules for manufacturability and principles of design for economic production.
2. Design components for different machining operations.
3. Casting design and choose the best casting process for a specific product.
4. Evaluate the effect of thermal stresses in weld joints.
5. Design components for sheet metal work by understanding in depth the sheet metal processes and their formation mechanisms.
6. Design of plastic components for machining, joining and selection of proper processing for different joining cases.

UNIT - I
Introduction: Design philosophy-steps in design process-general design rules for manufacturability-basic principles of designing for economical production - creativity in design.

UNIT - II
Machining processes: Overview of various machining processes-general design rules for machining-dimensional tolerance and surface roughness- Design for machining – ease –redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

UNIT - III

Metal casting: Appraisal of various casting processes, selection of casting process,-general design considerations for casting-casting tolerance-use of solidification, simulation in casting design-product design rules for sand casting.

UNIT - IV

Metal joining: Appraisal of various welding processes, factors in design of weldments – general design guidelines-pre and post treatment of weldseffects of thermal stresses in weld joints-design of brazed joints. Forging: Design factors for forging – closed die forging design – parting lines of dies –drop forging die design – general design recommendations.

UNIT – V

Extrusion & Sheet metal work: Design guide lines extruded sectionsdesign principles for punching, blanking, bending, deep drawing-Keeler Goodman forging line diagram – component design for blanking.

UNIT – VI

Plastics: Visco elastic and creep behavior in plastics-design guidelines for plastic components-design considerations for injection moulding – design guidelines for machining and joining of plastics.

Program Name: MECH Faculty Name: T. Lakshmi Devi

Class	Semester	Title of The Paper	Paper Code	W.E.F
IV	I	Nano Technology	RT41036	11/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
78 Hours	Theory 5	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.

2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs.

3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Outcomes:

1. Understand the basic concepts of nano technology &crystal structure.
2. Understand the properties of nano particles and electronic structure .Effect of size on properties on nano materials.
3. Applying the principles of nono technology in the preparation of nano structures.
4. Understand the different characterization techniques of various instruments.
5. Understand the characterization of carbon allotropes and their applications.
6. Applying the principles of nano technology for medicine, surface science, material science.

Course objective:

On successful completion of the course, students should be able to:
Understand the basic cientific concepts of nanoscience. Understand the properties of nano materials, characterization of materials, synthesis and fabrication. Understand the applications of nano technology in various science, engineering and technology fields.

SYLLABUS:

UNIT-I

INTRODUCTION: History of nano science, definition of nano meter, nano materials, nano technology. Classification of nano materials. Crystal symmetries, crystal directions, crystal planes. Band structure.

UNIT-II

PROPERTIES OF MATERIALS:

Mechanical properties, electrical properties, dielectric properties, thermal properties, magnetic properties, opto electronic properties. Effect of size reduction on properties, electronic structure of nano materials.

UNIT-III

SYNTHESIS AND FABRICATION: Synthesis of bulk polycrystalline samples, growth of single crystals. Synthesis techniques for preparation of nano particle – Bottom Up Approach – sol gel synthesis, hydro thermal growth, thin film growth, PVD and CVD; Top Down Approach – Ball milling, micro fabrication, lithography. Requirements for realizing semiconductor nano structures, growth techniques for nano structures.

UNIT-IV

CHARECTERIZATION TECHNIQUES: X-Ray diffraction and Scherrer method, scanning electron microscopy, transmission electron microscopy, scanning probe microscopy, atomic force microscopy, piezoresponse microscopy, X-ray photoelectron spectroscopy, XANES and XAFS, angle resolved photoemission spectroscopy, diffuse reflectance spectra, photoluminescence spectra, Raman spectroscopy.

UNIT-V

CARBON NANO TECHNOLOGY:

Characterization of carbon allotropes, synthesis of diamond – nucleation of diamond, growth and morphology. Applications of nano crystalling diamondfilms, grapheme, applications of carbon nano tubes.

UNIT-VI

APPLICATIONS OF NANO TECHNOLOGY:

Applications in material science, biology and medicine, surface science, energy and environment. Applications of nano structured thin fins, applications of quantum dots.

TEXT BOOKS:

1. Nano science and nano technology by M.S Ramachandra Rao, Shubra Singh, Wiley publishers.

REFERENCE BOOKS:

1. Introduction to Nano Technology by Charles P. Poole, Jr., Frank J.Owens, Wiley publishers.
2. Nanotechnology by Jermy J Ramsden, Elsevier publishers.
3. Nano Materials- A.K.Bandyopadhyay/ New Age Introdu.
4. Nano Essentials- T.Pradeep/TMH.
5. Nanotechnology the Science of Small by M.A Shah, K.A Shah, Wiley Publishers.
7. Principles of Nanotechnology by Phani Kumar, Scitech.

Program Name: Mechanical Faculty Name: D.KishoreBabu/K.Girish Kumar

Class	Semester	Title of The Paper	Paper Code	W.E.F
IV	I	**SIMULATION LAB**	**RT4103L**	19/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
39 Hours	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to apply the acquired Mechanical Engineering knowledge to solve engineering problems utilizing advanced technology for the advancement of society and oneself with confidence.
2. Successfully apply the principles of drafting and design, to analyze and evaluate using tools to solve real time problems of structural, thermal and allied field problems resulting in significant societal development.
3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices and to become responsible citizens with ethical values

Course Objectives:

1. To impart the fundamental knowledge on using various analytical

tools like ANSYS, FLUENT, etc., for Engineering Simulation.

2. To know various fields of engineering where these tools can be

effectively used to improve the output of a product.

3. To impart knowledge on how these tools are ued in Industries by

solving some real time problems using these tools..

Course Outcomes:

CO1: Create CAD models using modeling software.

CO2: Analyse structural engineering problems using ANSYS software.

CO3 Create parts on CNC lathe / CNC X Mill.

SYLLABUS:

1. DRAFTING : Development of part drawings for various components in

the form of orthographic andisometric. representation of dimensioning

and tolerances scanning and plotting. study of script, DXE and IGES

files.

2. PART MODELING : Generation of various 3D models through

protrusion, revolve, shell sweep. creation of various features. study of parent child relation. feature based and boolean based modeling surface and assembly modeling. study of various standard translators. design simple components.

3. a) Determination of deflection and stresses in 2D and 3D trusses and beams.

b) Determination of deflections component and principal and Von-mises stresses in plane stress, plane strain and Axisymmetric components.

c) Determination of stresses in 3D and shell structures (at least one example in each case)

d) Estimation of natural frequencies and mode shapes, Harmonic response of 2D beam.

e) Steady state heat transfer Analysis of plane and Axisymmetric components.

4. a) Development of process sheets for various components based on tooling Machines.

b) Development of manufacturing and tool management systems.

c) Study of various post processors used in NC Machines.

d) Development of NC code for free form and sculptured surfaces using CAM packages.

e) Machining of simple components on NC lathe and Mill by transferring NC Code / from a CAM package. Through RS 232.

f) Quality Control and inspection.

Packages to be provided to cater to drafting, modeling & analysis from the following:

Auto CAD, Micro Station, CATIA, Pro-E, I-DEAS, ANSYS, NISA, CAEFEM, Gibbs CAM, Master CAM etc.

Program Name: MECHANCIAL Faculty Name: K.Girish Kumar

Class	Semester	Title of The Paper	Paper Code	W.E.F
IV	II	Green Engineering Systems	RT42032	19/11/18

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
80 Hours	Theory 5	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to analyses and solve the problems in the domains of design, thermal and allied fields.

2 Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs **.**

3 Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Context and Overview:

The course aims to highlight the significance of alternative sources of energy, Green energy systems and processes and provides the theory and working Principles of probable sources of renewable and green energy systems that are environmental friendly.

Course Outcomes:

1. Implement solar photovoltaic cell application using various operating parameters.
2. Classify solar energy storage & describe wind energy potential.
3. Describe various unconventional energy sources like biomass, geothermal& OTEC and their importance in current scenario.
4. Select energy efficient electrical & mechanical system based upon end application.
5. Summarizing energy efficient process of various manufacturing & production systems.
6. Select various green materials for energy management of green buildings.

Course Content

UNIT-I
INTRODUCTION:
SOLAR RADIATION: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems. Photo voltaic energy conversion – types of PV cells, I-V characteristics.
SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT – II

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods,

sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

UNIT – III

BIO-MASS: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, bio fuels, I.C. engine operation and economic aspects.

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

OCEAN ENERGY: OTEC, Principles of utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT –IV

ENERGY EFFICIENT SYSTEMS:

(A) ELECTRICAL SYSTEMS: Energy efficient motors, energy efficient lighting and control, selection of luminaire, variable voltage variable frequency drives (adjustable speed drives), controls for HVAC (heating, ventilation and air conditioning), demand site management.

(B) MECHANICAL SYSTEMS: Fuel cells- principle, thermodynamic aspects, selection of fuels & working of various types of fuel cells, Environmental friendly and Energy efficient compressors and pumps**.**

UNIT-V

ENERGY EFFICIENT PROCESSES: Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, design and implementation of efficient and sustainable green production systems with examples like environmental friendly machining, vegetable based cutting fluids, alternate casting and joining techniques, zero waste manufacturing.

UNIT – VI

GREEN BUILDINGS: Definition, features and benefits. Sustainable site selection and planning of buildings for maximum comfort. Environmental friendly building materials like bamboo, timber, rammed earth, hollow blocks, lime & lime pozzolana cement, agro materials and industrial waste, Ferro cement and Ferro-concrete, alternate roofing systems, paints to reduce heat gain of the buildings. Energy management.

TEXT BOOKS:

1. Sukhatme S.P. and J.K.Nayak, *Solar Energy – Principles of Thermal Collection and Storage*, TMH.
2. Khan B.H., Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi, 2006.
3. Green Manufacturing Processes and Systems, Edited by J. Paulo Davim, Springer 2013.

REFERENCES:

1. Alternative Building Materials and Technologies / K.S Jagadeesh, B.V Venkata Rama Reddy and K.S Nanjunda Ra. 2. Principles of Solar Energy / Frank Krieth & John F Kreider.

3. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa
5. Renewable Energy Technologies/ G.D Roy

Program Name: MECHANICAL-A&B Faculty Name: N.V. Malavika

Class	Semester	Title of The Paper	Paper Code	W.E.F
IV	II	Non Destructive Evaluation	R1342034A	19/11/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
73 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.
PSO2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs
PSO3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

- The students are to be exposed to the concepts of various NDE techniques using radiography, ultrasonics, liquid penetrates, magnetic patches and Eddy currents.
- They will learn basic principles of these methods and will be able to select a testing process.
- They will understand the advantages and disadvantages of these techniques.

Course Outcomes:

19. Describe the historical and industrial scope of NDT by Radiographic Testing (RT) technique.
20. Understand the basic principle and equipments used for Ultrasonic Testing.
21. Understand the basic principle and equipments used for Liquid Penetrant Test.
22. Understand the basic principle, equipments, effectiveness, limitations and applications used for Magnetic Particle Test.
23. Understand the basic principle, equipments, effectiveness, limitations and applications used for Eddy Current Test.
24. Understand the different Industrial Applications of NDE.

UNIT – I

Introduction to non-destructive testing: Radiographic test, Sources of X and Gamma Rays and their interaction with Matter, Radiographic equipment, Radiographic Techniques, Safety Aspects of Industrial Radiography

UNIT – II

Ultrasonics test: Principle of Wave Propagation, Reflection, Refraction, Diffraction, Mode Conversion and Attenuation, Sound Field, Piezo-electric Effect, Ultrasonic Transducers and their Characteristics, Ultrasonic Equipment and Variables Affecting Ultrasonic Test, Ultrasonic Testing, Interpretations and Guidelines for Acceptance, Rejection - Effectiveness and Limitations of Ultrasonic Testing.

UNIT – III

Liquid Penetrant Test: Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System, Test Procedure, Effectiveness and Limitations of Liquid Penetrant Testing

UNIT – IV

Magnetic Particle Test: Magnetic Materials, Magnetization of Materials , Demagnetization of Materials,Principle of Magnetic Particle Test, Magnetic Particle Test Equipment, Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation and Evaluation, Effective Applications and Limitations of the Magnetic Particle Test.

UNIT – V

Eddy Current Test: Principle of Eddy Current, Eddy Current Test System, Applications of Eddy Current Testing Effectiveness of Eddy Current Testing

UNIT – VI

Industrial Applications of NDE: Span of NDE Activities Railways, Nuclear, Non-nuclear and Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, Offshore Gas and Petroleum Projects, Coal Mining Industry, NDE of pressure vessels, castings, welded constructions.

TEXT BOOKS:

1. Non-destructive test and evaluation of Materials, J Prasad, GCK Nair, TMH Publishers.
2. Ultrasonic testing by Krautkramer and Krautkramer.
3. Non-destructive testing, Warress, JMcGonmade.

REFERENCES:

1. Ultrasonic inspection training for NDT: E. A. Gingel, Prometheus Press.
2. ASTM Standards, Vol 3.01, Metals and alloys.
3. Non-destructive, Hand Book – R. Hamchand .

Program Name: MECHANICAL Faculty Name:Ch.Saraswathi

Class	Semester	Title of The Paper	Paper Code	W.E.F
IV	II	Production Planning and Control	RT42031	11/6/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
70 Hours	Theory 12	Practical 6	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1	Ability to analyze and solve the problems in the domains of design, thermal and allied fields.
PSO2	Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs
	Not selected as the course does not address any aspects.
PSO3	Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices.

Course Objectives:

This subject provides students with
1. An understanding of the concepts of production and service systems
2. The ability to apply principles and techniques in the design, planning and control of these systems to optimise/make best use of resources in achieving their objectives.
3. Identify different strategies employed in manufacturing and service industries to plan production and control inventory.
4. Measure the effectiveness, identify likely areas for improvement, develop and implement improved planning and control methods for production systems.

Course Outcomes:

1.Explain the concept of production & services system.

2.Describe the forecasting & apply the suitable techniques for estimating the forecasting

3.Discuss the inventory management & apply the suitable techniques to control the inventory

4. Explain different strategies (Routing& Scheduling) to plan the production.

5.Discuss the overview of dispatching

UNIT – I
Introduction: Definition – objectives and functions of production planning and control – elements of production control – types of production – organization of production planning and control department – internal organization of department.

UNIT – II
Forecasting – importance of forecasting – types of forecasting, their uses – general principles of forecasting – forecasting techniques – qualitative methods and quantitive methods.

UNIT – III

Inventory management – functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P–Systems and Q-Systems. Introduction to MRP I, MRP II, ERP, LOB (Line of Balance), JIT and KANBAN system.

UNIT – IV

Routing – definition – routing procedure –route sheets – bill of material – factors affecting routing procedure, schedule –definition – difference with loading.

UNIT – V

Scheduling policies – techniques, standard scheduling methods. Line Balancing, aggregate planning, chase planning, expediting, controlling aspects.

UNIT – VI

Dispatching – activities of dispatcher – dispatching procedure – follow up – definition – reason for existence of functions – types of follow up,applications of computer in production planning and control.

Program Name: mechanical engineering Faculty Name: V.Chandrika

Class	Semester	Title of The Paper	Paper Code	W.E.F
IV	II	POWER PLANT ENGINEERING	RT42033D	19/11/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
80 Hours	Theory 4	Practical	3	Internal 30	External 70	3

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

PSO1. Ability to analyse and solve the problems in the domains of design, thermal and allied fields.
PSO2. Develop and implement new ideas with the help of simulation tools which addresses societal and industrial needs
PSO3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices

Course Objectives:

The course is aimed at providing knowledge of power generation through different prime movers viz steam, ICGT, Hydro, nuclear and hybrid systems along with their economics and environmental considerations.

Course Outcomes:

CO 1: Understand the working of different circuits (or components) of steam power plant and their construction.

CO 2: Understand the working of components of diesel engine power plant and of different gas turbine power plants.

CO 3: Understand and study the hydrographs, construction of different types of dams and spillways.

CO 4: Study and understand the different nuclear reactors of nuclear power plant.

CO5: Study and understand the combined operation of different power plants and instrumentation of powerplant

CO 6: Evaluate the power plant economics and study the environmental consideration due to pollutants emitted by power plant and their control.

UNIT – I

Introduction to the sources of energy – resources and development of power in india.

STEAM POWER PLANT: Plant layout, working of differentcircuits, fuelandhandlingequipments, types of coals, coal handling, choice of handlingequipment, coal storage, ash handling systems. Combustion: properties ofcoal – overfeed and underfeed fuel beds, traveling grate stokers, spreader

stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, dust collectors, cooling towers and heat rejection. corrosion and feed water treatment.

UNIT – II

INTERNAL COMBUSTION AND GAS TURBINE POWER PLANTS:

DIESEL POWER PLANT: Plant layout with auxiliaries – fuel supply system, air starting equipment, super charging.

GAS TURBINE PLANT: Introduction – classification - construction –layout with auxiliaries, combined cycle power plants and comparison.

UNIT – III

HYDRO ELECTRIC POWER PLANT: Water power – hydrological cycle/ flow measurement – drainage area characteristics – hydrographs – storage and pondage – classification of dams and spill ways.

HYDRO PROJECTS AND PLANT: Classification – typical layouts –plant auxiliaries – plant operation pumped storage plants.

UNIT – IV

NUCLEAR POWER STATION: Nuclear fuel – breeding and fertilematerials – nuclear reactor – reactor operation.

TYPES OF REACTORS: Pressurized water reactor, boiling water reactor,sodium-graphite reactor, fast breeder reactor, homogeneous reactor, gascooled reactor, radiation hazards and shielding – radioactive waste disposal.

UNIT – V

COMBINED OPERATIONS OF DIFFERENT POWER PLANTS: Introduction, advantages of combined working, load division between powerstations, storage type hydro-electric plant in combination with steam plant,run-of-river plant in combination with steam plant, pump storage plant in combination with steam or nuclear power plant, co-ordination of hydroelectricand gas turbine stations, co-ordination of hydro-electric and nuclear power stations, co-ordination of different types of power plants.

POWER PLANT INSTRUMENTATION AND CONTROL: Importance of measurement andinstrumentation in power plant, measurement of waterpurity, gas analysis, O2 and CO2 measurements, measurement of smoke anddust, measurement of moisture in carbon dioxide circuit, nuclearmeasurements.

UNIT – VI

POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS: Capital cost, investment of fixed charges, operatingcosts, general arrangement of power distribution, load curves, load durationcurve, definitions of connected load, maximum demand, demand factor,average load, load factor, diversity factor – related exercises. effluents from power plants and Impact on environment – pollutants and pollution standards– methods of pollution control.

Program Name: Mechanical Faculty Name: D.KishoreBabu

Class	Semester	Title of The Paper	Paper Code	W.E.F
IV	I	**COMPUTATIONAL FLUID DYNAMICS LAB**	**RT410 3L**	19/06/2018

SYLLABUS

Total No.of Hours for Teaching-Learning	Instructional Hours for Week		Duration of semester End Examination in Hours	Max Marks		Credits
39 Hours	Theory	Practical 3	3	Internal 25	External 50	2

Programme Outcomes:

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, 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.

Programme Specific Outcomes:

1. Ability to apply the acquired Mechanical Engineering knowledge to solve engineering problems utilizing advanced technology for the advancement of society and oneself with confidence.
2. Successfully apply the principles of drafting and design, to analyze and evaluate using tools to solve real time problems of structural, thermal and allied field problems resulting in significant societal development.
3. Engage professionally in industries or as an entrepreneur by applying manufacturing and management practices and to become responsible citizens with ethical values

Course Objectives:

• Solving Problems of fluid mechanics and heat transfer by writing programs in C-language and MATLAB.

• Using ANSYS-FLUENT build a geometry, mesh that geometry, Perform CFD method on the mesh, perform the calculation, and post-process the results.

• Understanding the validation of the numerical result by comparison with known analytical results.

• Understanding the numerical result by invoking the physical principles of fluid mechanics and heat transfer.

Course Outcomes:

CO1: Create CAD models using modeling software.

CO2: Analyse structural engineering problems using ANSYS software.

CO3 Create parts on CNC lathe / CNC X Mill.

SYLLABUS:

PART-A
Writing Programs in C and MATLAB for the following:
1. Solution of Transcendental equations
2. Solution of Simultaneous algebraic equations
3. Numerical differentiation and Integration
4. Solution of Ordinary Differential Equation
5. Solution of a Tri-diagonal matrix using Thomas Algorithm.
6. Solution of Partial differential equations related to
i) Elliptical Partial differential equations
ii) Parabolic Partial differential equations

iii) Hyperbolic Partial differential equations
7. Solution of 1-D and 2-D heat conduction with (Finite Difference method)
i) Constant temperature boundary conditions
ii) Constant heat flux boundary conditions
iii) Convective boundary conditions
8. Solution of Incompressible Navier-Stokes equations (Finite difference and Finite Volume methods)
9. Solution of Inviscid incompressible fluid flows.(Finite difference and Finite Volume methods)
PART-B
Using ANSYS-FLUENT solve the following problems of heat transfer analysis
1. steady state conduction
2. Lumped heat transfer
3. Convective heat transfer – Internal flow (study both velocity and thermal boundary layers)
4. Convective heat transfer – External flow (study both velocity and thermal boundary layers)
5. Radiation heat transfer– Emissivity

PRINCIPAL
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