NETAJI SUBHASH INSTITUTE OF TECHNOLOGY, BIHTA, PATNA

Bachelor of Technology

Department of Machanical Engineering

List of Course Outcomes with Program Outcome Mapping

SEMESTER - I

Course Name : **BASIC ELECTRICAL ENGINEERING**	Course Code : **100101**
At the end of course student will able to	
CO 1	Examine and execute the basic concepts of AC and DC electric circuit and its behaviour.
CO 2	Analyse the fundamental ideas behind magnetic circuits, including their definition, magnetic hysteresis phenomena, B-H curve, and hysteresis loop
CO 3	Apply the essential ideas and definitions of AC circuits, including single-phase, three-phase, RC and RLC circuits, and star and delta connections.
CO 4	Identify the different kinds of single-phase transformers and to compute efficiency, losses, and regulations.
CO 5	Understand the working principles of Electrical Machines

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	3	3	1	2		2	2			1	0	1	1	1
C02	2	2	1	3		2	2			1	1	1	2	1
C03	3	3	1	0		2	3			1	1	1	1	2
C04	3	3	2	3		2	3			1	2	3	1	1
C05	3	3	1	2		2	3			1	2	3	0	2
Average	2.8	2.8	1.2	2		2	2.6			1	1.2	1.8	1	1.4

Course Name : **ENGINEERING GRAPHICS & DESIGN**	Course **Code : 100102**
At the end of course student will able to	
CO 1	Apply the concept of drawing in practical applications
CO 2	Draw the projection of points, lines and planes
CO 3	Classify solids and projection of solids at different positions
CO 4	Show sectioned view of solids and development of surfaces
CO 5	Discuss about conics and orthographic views , isometric view of engineering components.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	2	1	1	1		2	1		1	1		2	1	
CO2	1	1	1	1	2				1	1			2	
CO3		1	1	1	1					1				2

CO4		1	1	1					1	1				2
CO5			1	1	1		1		1	1	2	1		1
Average	1.5	1	1	1	1.33333	2	1	0	1	1	2	1.5	1.5	1.66667

Course Name : **PHYSICS (ELECTROMAGNETISM)**	Course **Code : 102101**
At the end of course student will able to	
CO 1	Evaluate the physical quantities of electromagnetic fields in different media and apply gauss law
CO 2	Describe static electric field boundary conditions, nature of dielectric material and evaluate potential fields
CO 3	Explain steady magnetic fields, their behaviour in different media and associated law
CO 4	Analyse time varying electric & magnetic field.
CO 5	Understand the Maxwell equation in different forms & medium.
CO 6	Describe the propagation of Electromagnetic waves and its nature in different medium .

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	3	1	2	1	2		1			1				
C02	2	2	2	2	2		1			1				
C03	2	2	2	1	2		1			1				
C04	3	2	2	2	2		1			1				
C05	3	3	3	1	2		1			1				
C06	3	3	2	1	2		1			1				
Average	2.66667	2.16667	2.16667	1.33333	2		1			1				

Course Name : **MATHEMATICS - I**	Course Code : **102102**
At the end of course student will able to	
CO 1	Learn properties of real line and learn the concept of limit, continuity, differentiability of a real valued function and how to expand a function in powers of independent variable.
CO 2	Understand the basics of Gamma and Beta function and Riemann integral for computing area, volume, mass etc.
CO 3	Solve a function in powers of independent variable; its properties and Fourier series.
CO 4	Apply theory of Matrices and its applications.
CO 5	Describe about the maxima and minima of two variables using Lagrange’s multiplier, tangent and normal plane.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	2	3	1	2	1		1			1	2			

C02	3	3	1	3	2					1		1	1	
C03	3	1												1
C04	3	3	2	2	2	3	1							
C05	3	3	1	2	2		2				2		1	
Average	2.8	2.6	1.25	2.25	1.75	3	1			1	2	1	1	1

Course Name : **BASIC ELECTRICAL ENGINEERING (P)** Course Code : **100101P**	
At the end of course student will able to	
CO 1	Get an exposure to basic electrical laws.
CO 2	Understand the response of different types of electrical circuits to different excitations.
CO 3	Understand the measurement,calculation and relation between the basic electrical parameters.
CO 4	Understand the the basic characteristics of transformer and electrical machines.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	3	3	1	2		2				1		1	1	
C02	2	2	1	3		2	1			1	1	1		1
C03	3	3	1			2	1			1	1	1		
C04	3	3	2	3		2	1			1	2	3	1	
Average	2.75	2.75	1.25	2.66667		2	1			1	1.33333	1.5	1	1

Course Name : **ENGINEERING GRAPHICS & DESIGN (P)** Course **Code : 100102P**	
At the end of course student will able to	
CO 1	Get acquainted with the knowledge of various lines, geometrical constructions and construction of various kinds of scales, and Ellipse.
CO 2	Improve their imagination skills by gaining knowledge about points, lines and planes.
CO 3	Become proficient in drawing the projections of various solids.
CO 4	Gain knowledge about orthographic and isometric projections.
CO 5	Development of surface of different kind of solid.
CO 6	Gain knowledge of basic Auto Cad command and their uses.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	2	1	1	1		2	1		1	1		2	1	
CO2	1	1	1	1	2				1	1			2	

CO3		1	1	1	1					1				1
CO4		1	1	1					1	1				2
CO5			1	1	1		1		1	1	2	1		1
CO6				1	3			2		1		1		
Average	1.5	1	1	1	1.33333	2	1	2	1	1	2	1.5	1.5	1.33333

Course Name : **PHYSICS (ELECTROMAGNETISM) (P)**	Course Code : **102101P**
At the end of course student will able to	
CO 1	Experimental verification of Faraday's law of electromagnetic induction
CO 2	To study Hall Effect and determine Hall coefficient, carrier density and mobility of agiven semiconductor material using Hall effect setup.
CO 3	To determine the time constant of RC circuit and resonance condition of a series LCR circuit.
CO 4	To observe the motion of a charged particle acting due to the external magnetic field created by a Helmholtz coil.
CO 5	Determine the frequency of alternating current using sonometer and they will be able to relate the tension of the wire, linear density of the wire, and the resonating length of the wire.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	2	2	1	2		2	2		1	1	1			
C02	2	2	1	2		2	2		1	1	1		1	
C03	2	2	1	2		2	2		1	1				1
C04	2	2	1	2		2	2		1	1				
C05	2	2	1	2		2	2		1	1				
Average	2	2	1	2	0	2	2	0	1	1	1	0	1	1

SEMESTER - II

Course Name : **CHEMISTRY**	Course Code : **100203**
At the end of course student will able to	
CO 1	Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
CO 2	Rationalise bulk properties and processes using thermodynamic considerations.
CO 3	Analyze hardness of water for industrial and domestic applications.
CO 4	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
CO 5	Learn periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
CO 6	List major chemical reaction that are used in the systhesis of molecules

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	2	2	1	2	1			3		2		2	2	2
C02	1	1	1	2	2					1	1	2	1	
C03	1	1	2	2	3	3	2		1	2	3	2	1	1
C04	2	2	2	3	2	2	2		1	2	2	3	1	2
C05					1			3		1		2	1	
C06	2	2	2	3	3	3	2		1	2	3	3	1	1
Average	1.6	1.6	1.6	2.4	2	2.66667	2	3	1	1.66667	2.25	2.33333	1.16667	1.5

Course Name : **PROGRAMMING FOR PROBLEM SOLVING** Course Code : **100204**

At the end of course student will able to

CO 1	Formulate simple algorithms for arithmetic and logical problems.
CO 2	Translate the algorithms to programs (in c language).
CO 3	Test and execute the programs and correct syntax and logical errors.
CO 4	Implement conditional branching, iteration and recursion.
CO 5	Decompose a problem into functions and synthesize a complete program using divide and conquer approach.

	P01	PO2	P03	P04	P05	PO6	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	2	1	1	1					1	1		1		
C02		1	1	1					1	1		1		
C03		1	1	1			1		1	1		1		
C04	1	1	1	1			1		1	1		1		
C05	1	1	1	1			1		1	1		1		
Average	1.33333	1	1	1			1		1	1		1		

Course Name : **WORKSHOP MANUFACTURING PRACTICES** Course **Code : 100205**

At the end of course student will able to	
CO 1	Undersatnd different types of manufacturing techniques, their advantagas with their economic,socail and susatainable aspects.
CO 2	Apply principalof fundamental and advanced mathematics, basic science and engineering, statistical techniques to calculate process parameters and design parameters to craete a product satisfying national and international standards used in any manufacturing process.
CO 3	Compare, analyze,document and present various traditional workshop manufacturing processes as well as modern manufacturing tools.
CO 4	Analyze alternative design as well as economic aspects of a given manufacturing process
CO 5	Identify emerging technologies and make students aware of them for their continuous professional growth by bridging knowledge about emerging industry oriented technology

	P01	PO2	P03	P04	P05	PO6	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	1	1	1	1	2					1		1	1	
CO2	1	2	1	2	2	2		2	3	1	1	2	2	
CO3	2	1	1	2	2		1		1	3	1			1
CO4	3	1	2	2	1					1	2	2		2
CO5	2	2	1	1	1		3	3			2	1		1
Average	1.8	1.4	1.2	1.6	1.6	2	2	2.5	2	1.5	1.5	1.5	1.5	1.33333

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CO 5	Identify emerging technologies and make students aware of them for their continuous professional growth by bridging knowledge about emerging industry oriented technology

	P01	PO2	P03	P04	P05	PO6	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	1	1	1	1	2					1		1	1	
CO2	1	2	1	2	2	2		2	3	1	1	2	2	
CO3	2	1	1	2	2		1		1	3	1			1
CO4	3	1	2	2	1					1	2	2		2
CO5	2	2	1	1	1		3	3			2	1		1
Average	1.8	1.4	1.2	1.6	1.6	2	2	2.5	2	1.5	1.5	1.5	1.5	1.33333

Course Name : **ENGLISH**	Course Code : **100206**
At the end of course student will able to	
CO 1	Communicate effectively and write and present properly.
CO 2	Work individually and in intra disciplinary and multidisciplinary teams.
CO 3	Understand recognition of the need for lifelong learning and to access information as well as development in science and technology.
CO 4	Develeop knowledge of project management, risk management, innovation and change management, entrepreneurship and sustainable development.
CO 5	Define,identify, formulate and solve complex engineering problems as well as electing and applying appropriate analysis and modelling methods for wide purpose.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	3	3	1	1	2		2			1	1	3	1	2
C02	3	1	1	3	2					2	1	2		2
C03	3	1	1	1	2	3	3			2	2	1		1
C04		2	1	1	2		2			1	1	2	1	0
C05		1	1	2	2			2	1	3	1	3	0	1
Average	3	1.6	1	1.6	2	3	2.33333	2	1	1.8	1.2	2.2	0.66667	1.2

Course Name : **MATHEMATICS - II (ODE & COMPLEX VARIABLES)** Course Code : **102202**

At the end of course student will able to	
CO 1	Discuss the double and triple integrals and its applications.
CO 2	Learn linear, non linear partial differential equations of first order and their solutions.
CO 3	Study first, higher order OdE and their solutions.
CO 4	Understand differentiation of functions of complex variables. Apply the tools of integration of functions of complex variables
CO 5	Illustrate real integrals for various complex engineering problems

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	2	3	1	2	1		2			1	2			
C02	3	3	2	3	2					1		1	1	
C03	3	1	1		2					1	1	0		1
C04	3	3	2	2	2	3	2				2	1		
C05	3	3	1	2	2		1				2	0		
Average	2.8	2.6	1.4	2.25	1.8	3	1.66667			1	1.75	0.5	1	1

Course Name : **CHEMISTRY(P)**	Course **Code : 100203P**
At the end of course student will able to	
CO 1	Determine the chloride content of water.
CO 2	Learn and apply basic techniques used in chemistry laboratory for volumetric analysis; redox titrations with different indicators; EDTA titrations.
CO 3	Expose different methods of chemical analysis and use of some commonly employed instruments.
CO 4	Synthesize a small drug molecule and analyze a salt sample.
CO 5	Estimate rate constants of reaction from concentration of reactant such as surface tension and viscosity

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	2	1		1									1	
C02	1	1		1		3	3		1		2	1		
C03	1	2	1	2	2	2	2			1	2			1
C04	1	1	2	3	2	3	3		2	2	3	2	2	
C05	2	1	2	2	2				1	2		1	2	
Average	1.4	1.2	1.66667	1.8	2	2.66667	2.66667		1.33333	1.66667	2.33333	1.33333	1.66667	1

Course Name :**PROGRAMMING FOR PROBLEM SOLVING(P)** Course **Code :100204P**	
At the end of course student will able to	
CO 1	To formulate simple algorithms for arithmetic and logical problems.
CO 2	To translate the algorithms to programs (in c language).
CO 3	To test and execute the programs and correct syntax and logical errors.
CO 4	To implement conditional branching, iteration and recursion.
CO 5	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	2	1	1	1					1	1		1		
C02		1	1	1					1	1		1		
C03		1	1	1			1	0	1	1		1		
C04	1	1	1	1			1	0	1	1		1		
C05	1	1	1	1	0	0	1	0	1	1	0	1	0	0
Average	1.33333	1	1	1	0	0	1	0	1	1	0	1	0	0

Course Name :**WORKSHOP MANUFACTURING PRACTICES(P)** Course **Code:100205P**	
At the end of course student will able to	
CO 1	Understand the appropriate conventional and modern tools, materials, instruments required for specific operations with their limitations in workshop.
CO 2	Identify , develop and improve practical skills in various machining operations and safety consciousness and show team work.
CO 3	Design ,anlayze ,create and inspect an object in workshop using various machine and hand tool available in different shops such as fitting , carpentary weleding and machine shop.
CO 4	Apply different conventional and advanced manufacturing techniques and measuring instruments for making a job with help of laws of basic science under economic constraints.
CO 5	Discriminate and develop various sustainable,ethical and cost-effective solutions for real engineering problems using machine and equipments in workshop .

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	2					1		1	1	
CO2	1	2	1	2	2	2		2	3	1	1	2	2	
CO3	2	1	1	2	2		1		1	3	1			1
CO4	3	1	2	2	1					1	2	2		2
CO5	2	2	1	1	1		3	3			2	1		1
Average	1.8	1.4	1.2	1.6	1.6	2	2	2.5	2	1.5	1.5	1.5	1.5	1.33333

Course Name : **ENGLISH(P)**	Course Code : **100206P**
At the end of course student will able to	
CO 1	Identify common errors in spoken and written communication.
CO 2	Get familiarized with English vocabulary and language proficiency.
CO 3	Improve nature and style of sensible writing, acquire employment and workplace communication skills.
CO 4	Improve their Technical Communication Skills through Technical Reading and Writing practices.
CO 5	Perform well in campus recruitment, engineering and all other general competitive examinations

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	2	2	2	1	2		1			2	2	2		
C02		2	2	2	2					1	1	1	1	
C03	3	1	1		2					2	1			
C04	1	2	2	2	2	3	2			1	1	1		1
C05	2	1	1	1	2	2				1	1	2		
Average	2	1.6	1.6	1.2	2	1	0.6			1.4	1.2	1.2	1	1

SEMESTER - III

Course Name : **BIOLOGY FOR ENGINEERS**	Course **Code : 100301**
At the end of course student will able to	
CO 1	Describe how biological observations of 18th Century that lead discoveries.
CO 2	Conveythat classification per seis not biology is all about highlight the underlaying criteria such as mophplogical, biochemical, and ecological.
CO 3	Highlight the concepts of recessiveness and dominance during the passage of genetic material from parents to offsprings.
CO 4	Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine .

CO 5	Classify enzymes and distinguish between different mechanisms of enzymes action .
CO 6	Identify DNA as a genetic material in the molecular basis of information trasfer.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	1		1	1	1			3		1		1	1	
C02	2	1	1	1	1		1	2	1	2		1		1
C03	1	1		1							1			1
C04	2	1	1	1		2		2		1	1		1	
C05		1		1	2					1				
C06		1	2	1	3		1		1	1				
Average	1.5	1	1.25	1	1.75	2	1	2.33333	1	1.2	1	1	1	1

Course Name : **BASIC ELECTRONICS ENGINEERING** Course Code : **100303**

At the end of course student will able to

CO 1	Understanding of the fundamental concepts of electronics and its characteristics,concept of design regulator and DC power supply.
CO 2	Design the basic circuits using op-amp and perform operations and their troubleshooting.
CO 3	Understand to design different type of amplifier.
CO 4	Understand the basic about power transistor circuits.
CO 5	Study about modulation ,mobile communication system & IEEE frequency spectrum.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	3	2	1	2	2		3			3	3	3	1	
C02	2	2	1	2	3		3			3	2	2		
C03	2	2	1	2	3		3			2	1	1		
C04	2	1		1	1	3	3			2	1	1		
C05	2	1	1	1	1						2	3		1
Average	2.2	1.6	1	1.6	2	3	3			2.5	1.8	2	1	1

Course Name : **ENGINEERING MECHANICS** Course Code : **100309**

At the end of course student will able to

CO 1	Identify unknown forces in relation to a given equilibrium force system using derived scintific ,mechanical and mathematical laws.
CO 2	Analyze and document the static and dynamic friction laws with proper assumptions and approximation for the equilibrium state of a wedge, ladder and screw jack.

CO 3	Calculate the centre of mass, centroid, centre of gravity and moment of inertia for the simple and composite plane sections using principal of mechanics and basic mathematics
CO 4	Understand and verify various theorem regarding work and energy and momentum methods for particles and rigid bodies and their application in real life engineering problems
CO 5	Apply the knowledge of kinetics and kinematics in solving the real time problems.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	3	2	1		2					1	1	1	1	
CO2		1	2	1	2	2	1	2	1	3	1			2
CO3	2	1	1		1		1	2	1	2	1		1	1
CO4		1	1	1	2					2		2		
CO5	2	1	1	1			1			1			1	1
Average	2.33333	1.2	1.2	1	1.75	2	1	2	1	1.8	1	1.5	1	1.33333

Course Name : **MATHEMATICS-III** Course Code : **100312**

At the end of course student will able to

CO 1	Apply the effective mathematical tools for the solutions of ordinary differential equation of higher order that model physical phenomena and engineering problems.
CO 2	Have a better understanding of partial differential equations of first order and their solution processes that are used in various techniques dealing engineering problems.
CO 3	Apply the effective mathematical tools for solutions of partial differential equations of higher order that model physical phenomena and engineering problems.
CO 4	Understand differentiation of functions of complex variables. Apply the tools of integration of functions of complex variables.
CO 5	Illustrate real integrals for various complex engineering problems.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	2	3	1	2	1		1			1	2			
C02	3	3	1	2	2					1				
C03	3												1	
C04	3	3	2	2	2	3	2				2	2		1
C05	2	2		1	2		1				3			
Average	2.6	2.75	1.33333	1.75	1.75	3	1.33333	0	0	1	2.33333	2	1	1

Course Name : **THERMODYNAMICS** Course Code : **102304**

At the end of course student will able to

CO 1	Understand thermodynamics terminology and different types of work along with mathematical expression. Have knowledge about thermodynamic properties and mathematical relation between them along with graphical representation..
CO 2	Understand, discuss and derived the laws of thermodynamics and apply these laws in various engineering system. Identify high and low grade energy.

CO 3	Understand pure substances, ideal gas and gas mixture, saturated state and relation between pressure and temperature of pure substance and its graphical representation.
CO 4	Analyse, understand and apply compressibility chart, steam table, thermodynamics parameters and molier chart in different engineering systems.
CO 5	Understand dry and wet air, psychrometric process and solve problem based on psychometric processs.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	2	2	1	1	2		2			2		2		1
CO2	2	3		1	2	2	3			2	1	2	1	
CO3	2	3		1	2	2	2		1	2	1	2		
CO4	2	2	1	1	1					2		2	1	2
CO5		2	1	1	2	2	1			2		2		1
Average	2	2.4	1	1	1.8	2	2		1	2	1	2	1	1.33333

Course Name : **ENGINEERING MECHANICS (P)** Course Code : **100309P**

At the end of course student will able to

CO 1	Understand practical application of mechanical compenents such as flywheel ,pulley and determine related parameters such as moment of inertia of a flywheel.
CO 2	Learn the concept of friction through inclined plain experiment and verify Newton's laws of motion and conservation principles with help of data .
CO 3	Identify an engineering problem and recognize the experiments needed to analyze it, in the light of Engineering Mechanics knowledge.
CO 4	Perform experiments and find out unknowns such as forces, moments, positions and velocities following the instructions and present relations with help of appropiate method such as graphs.
CO 5	Perform experiments in laboratory as being part of team , share information with each othet and learn to work as single unit.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1		2	1	1	2	3	1			1	2	2		1
CO2	3	2	1	3	1		1			3	1	2	1	1
CO3	2	3	1	2	2	2	3	2			2	2	1	
CO4	2	1	1	3	2					3	2	1		
CO5									2	2	1	1	1	
Average	2.33333	2	1	2.25	1.75	2.5	1.66667	2	2	2.25	1.6	1.6	1	1

Course Name : **Internship(P)** Course Code : **100399P**

At the end of course student will able to

CO 1	Develop communication, interpersonal and other critical skills in the job interview process.
CO 2	Explore career alternatives prior to graduation.

CO 3	Handle real life challenges by making effective decisions at the organisations.
CO 4	Adapt efficienty to dynamic industrial environment.
CO 5	Assess interests and abilities in field of mechanical engineering.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	2	2	1		2		3		3	3		2	1	2
CO2	2	1	1	2	3	2	3		3	3	1	3	3	1
CO3	2	2	1	1	3		3		3	3	2	3		2
CO4	2	2	2	1	3	3	3		3	3	2	2		2
CO5	2	1	1	2	3	2	3		3	3		2		1
Average	2	1.6	1.2	1.5	2.8	2.33333	3		3	3	1.66667	2.4	2	1.6

Course Name : **Machine Drawing(P)** Course Code : **102302P**

At the end of course student will able to

CO 1	Identify the national and international standards pertaining to machine drawing.
CO 2	Apply limits and tolerances to assemblies and choose appropriate fits.
CO 3	Recognize machining and surface finish symbols.
CO 4	Explain the functional and manufacturing datum.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	2	1		1						1	2		1	
C02	1	1	1	2	2					2				1
C03		1	1		2					1		1		
C04	1	1		1			2	2		1	2			
Average	1.33333	1	1	1.33333	2		2	2		1.25	2	1	1	1

SEMESTER - IV

Course Name : **Applied Thermodynamics** Course Code : **102401**

At the end of course student will able to

CO 1	Explain the working principle of air standard cycles.
CO 2	Classify the IC engines along with the working principle and combustion process.
CO 3	Discuss the functionality of steam nozzles and steam turbines in power generation.

CO 4	Explain the working of air compressor along with factors influencing its performance.
CO 5	Compute the cooling load for air conditioning and COP of refrigeration systems.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
	3	3	2	1	2		2			1	1	3		
CO2	2	2	1	3	2					2	1	2		2
CO3	3	1	1	2	2	3	3			2	2	1	1	1
CO4	2	2	1	1	2		2			1	1	2	1	
CO5		1	1	2	2			2	1	3	1	3		1
Average	2.5	1.8	1.2	1.8	2	3	2.33333	2	1	1.8	1.2	2.2	1	1.33333

Course Name : **Engineering Materials**	Course Code : **102402**
At the end of course student will able to	
CO 1	Identify the need of new material and apply basic science and engineering principle in development of new material as well as study of application and limitation of existing materials.
CO 2	Calculate different lattice parameters in metals and alloys with help of basic and advanced mathematical techniques and understand their importance in industrial as well as research field.
CO 3	Interpret effect of various heat treatment process and its effect on properties of steel being used in various sectors of society.
CO 4	Produce different cost effective methods of producing different grades steels ,follwing legislative and ethical standard for automobile and other industrial applications that can aid in sustainable development of nation.
CO 5	Document and present relevant knowledge from different types of steels,non-ferrous alloy and ceramics .

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
	2	2	1	1	3	2	1			1	2	3	1	
CO2	2	3	1	3	2				1	3	1	3	3	2
CO3	3	1	1		1	2	1			1	1		3	2
CO4		1	1	1		2	3	2		1	2	2		1
CO5			1	2	1	2		2		3	1	1		1
Average	2.33333	1.75	1	1.75	1.75	2	1.66667	2	1	1.8	1.4	2.25	2.33333	1.5

Course Name : **Fluid Mechanics**	Course Code : **102403**
At the end of course student will able to	
CO 1	Understand the effect of fluid properties and also able to evaluate the fluid pressure and use various devices for measuring fluid pressure.
CO 2	Analyse fluid flow patterns and apply continuity and Bernoulli equation to it.
CO 3	Analyze different types fluid flow measuring devices and utilize fluid mechanics principles in design.

CO 4	Apply boundary layer and flow separation conceptsto determine lift and drag forces.
CO 5	Perform dimensional analysis and use dimensionless parameters to predict and compare fluid flow behaviour.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
	2	3	1	3	2	2	1			3	2	2	1	
CO2	2	3	2	2	2	2	1			3	1	1	2	
CO3	2	3	2	3	2	2	1			3	2	2		1
CO4	2	3	2	2	2	2	1			3	1	1		2
CO5	2	3	1	2	2	2	1			3	1	1		1
Average	2	3	1.6	2.4	2	2	1			3	1.4	1.4	1.5	1.33333

Course Name : **Instrumentation & Control**	Course Code : **102404**
At the end of course student will able to	
CO 1	Provide a basic knowledge about measurements systems and their components.
CO 2	Learn about various sensors used for measurement of mechanical quantities.
CO 3	Understand computerized data acquisition.
CO 4	Learn about system stability and control.
CO 5	Analyze the dynamic response and the calibration of instruments.
CO 6	Integrate the measurement systems with the process for process monitoring and control.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	3	2	2	3	3	3	2			2	3	2	1	
C02	2	2	2	2	1	2	1			3	3	2		
C03	2	3	2	3	3	3	3			3	3	2	1	1
C04	3	2	2	3	3	3	3			3	2	2		1
C05	3	3	3	3	3	3	2			3	3	3		
C06	3	3	3	3	3	3	3			3	3	3		
Average	2.66667	2.5	2.33333	2.83333	2.66667	2.83333	2.33333			2.83333	2.83333	2.33333	1	1

Course Name : **Strength of Materials**	Course Code : **102405**
At the end of course student will able to	
CO 1	Identify properties of various mechanical Properties of material and their importance in designing a safe component.

CO 2	Understand how different components will fail under load with help of theories of failure for brittle and ductile materials.
CO 3	Apply concepts of stress, strain, principle stress using basic scientific and enhieering principals.
CO 4	Analyze the concept of bending and shear stresses using scientific theories and mathematics as well as it to create safe designs.
CO 5	Design and document various components using theries of failure.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
	2	2	1	1	1		2					2	1	
CO2	2	3	2	1		2	2				1	2	3	2
CO3	3	1	1	1			2			1		2	3	2
CO4		1	1	1			1	2	1	2	1	2		1
CO5			1	2	2	2	3	2		3	2	2		1
Average	2.33333	1.75	1.2	1.2	1.5	2	2	2	1	2	1.33333	2	2.33333	1.5

Course Name : **Fluid Mechanics(Practical)** Course Code : **102403P**

At the end of course student will able to

CO 1	Understand the knowledge about the basic properties of fluids.
CO 2	Find out various conditions related to stability of floating bodies.
CO 3	Analyse the fluid motion through Reynolds number.
CO 4	Apply Bernoulli's equation in flow measuring devices together withtheir calibration.
CO 5	Determine the sources of major and minor losses developed inside the fluid flowing pipe.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	2	3	2	3	2	2	1			3	1	1		
C02	2	3	2	3	2	2	1			3	1	1		
C03	2	3	2	3	2	2	1			3	1	1		
C04	2	3	2	3	2	2	1			3	1	1		
C05	2	3	2	3	2	2	1			3	1	1		
Average	2	3	2	3	2	2	1			3	1	1		

Course Name : **Strength of Materials (P)** Course Code : **102405P**

At the end of course student will able to

CO 1	Understand the need to analyze various strength of a specimen and failure modes for applying in a practical design based project work.

CO 2	Determine the hardness, impact strength, fatigue strength to analyze the application of a specific material for a given design. requirements for different loading conditions of structures or machines
CO 3	Analyze the bending stresses which further build the foundation of using modern analysis software.
CO 4	Evaluate the capacity of a material to withstand torsional stresses for a safe and sustainable design of machine elements.
CO 5	Show validiate results in form of table, graphs etc and compare it with existing references.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01		1	2	1							2	3	1	
C02	3	1	1	1	2	3		3	1	2	3		1	1
C03	3	1	1	1	2	3	2	3	1	2	3		1	
C04	3	1	2	1	2	3	2	3	1	2	3			1
C05		1	1	2	3				1	2	1	3		1
Average	3	1	1.4	1.2	2.25	3	2	3	1	2	2.4	3	1	1

SEMESTER - V

Course Name : **Fluid Machinery** Course Code : **102501**

At the end of course student will able to

CO 1	Understand the deformation behavior of solids under different types of loading and mathematical solution for simple geometries.
CO 2	Understand the basic knowledge of engineering design and its limitations of the machines for required application.
CO 3	Apply knowledge to determine performance characteristics of radial and axial flow of turbines and pumps.
CO 4	Develop and evaluate the performance and its calculation of pumps and tubines.
CO 5	Studies and testing models of hydraulic machines.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	2	1		1							1	3	1	
CO2	3	2	1	1						1	1	1	2	
CO3	2	1	1	1			1				2	2		2
CO4	3	2		2	1	2	2			1		3		2
CO5	2	2	1	1		2	3			1	2	2		1
Average	2.4	1.6	1	1.2	1	2	2	0	0	1	1.5	2.2	1.5	1.66667

Course Name :**Heat Transfer** Course Code : **102502**

At the end of course student will able to

CO 1	Explain about the real time applications of solid medium heat transfer as well as fluid medium heat transfer with help of basic science and enginnering
CO 2	Apply fundamental and advanced mathematical techiques to devlop model various heat transfer modes.
CO 3	Identy the need of heat transfer devices such as exchangers, develop skill for designing heat transfer devices using engineering and scientific principle under economic,socail and legal consrtaints and express the knowledge of design skills for heat transfer devices .
CO 4	Understand various mode of heat transfer through a system and interconnect the relation between them
CO 5	Apply existing model and data related to heat transfer model to analyze problem to draw appropriate conclusion, identify it's limitation and develop new model to overcome limitatation

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	2	2		1	1									
C02	2	3	1	1	2					2			1	1
C03	3	1	2	1	1	2	1	3	1		2	1		1
C04		1		1	2					1		1	1	
C05					2				1	1		3		2
Average	2.33333	1.75	1.5	1	1.6	2	1	3	1	1.33333	2	1.66667	1	1.33333

Course Name : **Kinematics of Machine** Course Code : **102503**

At the end of course student will able to

CO 1	Understand the kinematics and rigid- body dynamics of kinematically driven machine components.
CO 2	Understand the motion of linked mechanisms in terms of the displacement, velocity and acceleration at any point in a rigid link.
CO 3	Design some linkage mechanisms and cam systems to generate specified output motion.
CO 4	Analyze the kinematics of gear trains.
CO 5	Apply principal of physics in kinematics of brakes.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	3	2	1	1	1	2	1					1	1	
CO2	2	1	1	2	2							3	2	
CO3	2				1	2	1							1
CO4														2
CO5														1
Average	2.33333	1.5	1	1.5	1.33333	2	1	0	0	0	0	2	1.5	1.33333

Course Name : **Manufacturing Processes** Course Code : **102504**

At the end of course student will able to

CO 1	Explain about the real time applications of solid medium heat transfer.
CO 2	Describe the real time applications of fluid medium heat transfer.
CO 3	Express the knowledge of design skills of heat exchangers.
CO 4	Illustrate the real time applications of radiation mode of heat transfer (no media).
CO 5	Relate the skill of mass transfer and its applications.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	3	2	1	2	2					2		1		
C02	3	2	1	2	2					2		1		
C03	3	2	1	2	2					2		1		
C04	3	2	1	2	2					2		1		
C05		1			2					2				
Average	3	1.8	1	2	2					2		1		

Course Name : **Summer Entrepreneurship - II(P)** Course Code : **100511P**

At the end of course student will able to

CO 1	Advance their skills in competitive analysis and iteration while utilizing design thinking
CO 2	Identify and secure customers, stakeholders, and team members through networks, primary customer research, and competitive and industry analysis
CO 3	Improve problem-solving skills and communicatiion by working in industrial enviroonment
CO 4	Create engineering solutions for real life industrial or socail problem using knowledge earned throughout the program
CO 5	Create oral and visual presentation skills build confidence in the skills necessary to cause others to act.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	1	1	2	1		2	1		2	2	2	2	1	2
CO2	1	2	2	1	1	2	3		3	3	2	3	3	1
CO3	1	2	3	2	2	2	3	2	3	3	3	3		2
CO4	1	2	3	2	2	2	3	2	2	3	1	2		2
CO5	1	1	2	1		2	2		2	2	3	3		1
Average	1	1.6	2.4	1.4	1.66667	2	2.4	2	2.4	2.6	2.2	2.6	2	1.6

Course Name : **Fluid Machinery(Practical)** Course Code : **102501P**

At the end of course student will able to

CO 1	Extract desired understanding and conclusion with quantity and limitation by analysis of impact of jet.
CO 2	Produce and validiate results through skillfull use of engineering tools and models such as pumps and turbine.
CO 3	Synthesise engineering requirement from a review of various turbines.
CO 4	Draw various characteristics curves for hydraulic turbine and pump to analyze machine's performance.
CO 5	Analyze data for trends and corelation of pumps and their limitation.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	3	2	1	2	3	2	2			1	2	3	1	
CO2	3	2	1	2	3	2	2			1		2	1	2
CO3	2	1	1	2	3	2	1			1	1	3	1	
CO4	3	1	2	2	3		2			1		2		2
CO5	3	2		3	1		1			1	2	2		1
Average	2.8	1.6	1.25	2.2	2.6	2	1.6	0	0	1	1.6667	2.4	1	1.6667

Course Name : **Heat Transfer(Practical)** Course Code : **102502P**

At the end of course student will able to

CO 1	Understand different mode of heat flow using laboratory apparatus
CO 2	Calculate thermal conductivity of a given material using fouriers law of conduction and understand its industrial application
CO 3	Analyze emmisivity of given grey surface using various principles of heat transfer by performing suitable experiments in laboratory experiment
CO 4	Differentiate between free convection and forced convection using experimental appartus in laboratory
CO5	Draw conclusions from experimental results and show results

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	2	1	1	2	1					1	1	3		
CO2	3	2	1	2	2	2	1	2			1	1	1	
CO3	3	2	1	3	3			2		1	1	2	1	
CO4	2	1		2	3			2		1	1	2		1
CO5		1	1	3	2			0	1	2				
Average	2.5	1.4	1	2.4	2.2	2	1	1.5	1	1.25	1	2	1	1

Course Name : **Manufacturing Processes(Practical)** Course Code : **102504P**

At the end of course student will able to

CO 1	Analyze the properties of moulding materials and prepare patterns and send mould cavity for various components.
CO 2	Apply electric arc welding and gas welding techniques and prepare efficient welded joint using appropriate welding technique.
CO 3	Understand various mechanical press working process and able to prepare various components of sheet metal using mechanical press working process such as blanking, punching, bending etc
CO 4	Apply suitable machining operations such as turning, thread cutting, milling and drilling through appropriate machine tool for mass production of components.
CO 5	Select the most appropriate manufacturing process for a given product design and cost constraint.
CO 6	Assess and improve the quality, reliability and safety of manufacturing process.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	3	2	1	2			1			3		1		1
C02	3	2	1	2			1			3		2	1	
C03	3	2	1	2			1			3		2		1
C04	3	2	1	2			1			3		2		
C05	2	2	1	2			1			3	2	1	1	2
C06	1	1		1			1			3		2		
Average	2.5	1.83333	1	1.83333			1			3	2	1.66667	1	1.33333

SEMESTER - VI

Course Name : **Design of Machine Elements** Course Code : **102601**

At the end of course student will able to

CO 1	Apply fundamentals of stress analysis, theories of failure, design consideration and factor of safety in the design a machine a components.
CO 2	Design of shaft on the basis of strength, rigidity and various types of coupling used in automobile and power generation field.
CO 3	Design and analyze temporary and permanent joint on various loading application.
CO 4	Design and analyze various types of clutches and brakes for automobile industries.
CO 5	Design spur, helical and bevel gear for various industrial application.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	2	2		1	1					2			1	
CO2	2	3	2	2	2					3		1	2	
CO3	2	3	2	2	2					3		1		1
CO4	2	3	2	2	2					3		1		2
CO5	2	3	2	2	2					3		1		1
Average	2	2.8	2	1.8	1.8	0	0	0	0	2.8	0	1	1.5	1.33333

Course Name : **Dynamics of Machinery**	Course Code : **102602**
At the end of course student will able to	
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.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	2	1	1	1	1	2	1			1		3	1	
CO2	1	1	1	2	2					1		1	2	
CO3		1	1		1	2	1			1				1
CO4	2	1	1	1		2	3					1		2
CO5	2	1	1	2	1					2		1		1
Average	1.75	1	1	1.5	1.25	2	1.66667	0	0	1.25	0	1.5	1.5	1.33333

Course Name : **Manufacturing Technology**	Course Code : **102603**
At the end of course student will able to	
CO 1	Get the knowledge of Jigs and Fixtures so as to design jigs and fixture for variety of operations as per national and international standards
CO 2	Understand principle of engineering metrology, measurement standards and instruments and apply this knowledge in workshop calculation
CO 3	Analyze vatrious cost effective material handling technologies used in factory automation.
CO 4	Implement the mechanical energy, chemical and electrochemical based unconventional machining process.
CO 5	Recognize the need of industries, current necessity and environment related issue.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	2	1	2	1	3	2	1			1	1	3	1	
C02	2	2	2	3	2					3	1	1	2	
C03	2	2	1							1	2	2		2
C04	2	1	1	1	3					1		2		2
C05		1	1	1		3	2	2			2	2		1
Average	2	1.4	1.4	1.5	2.66667	2.5	1.5	2	0	1.5	1.5	2	1.5	1.66667

Course Name : **Automation in Manufacturing**	Course Code : **102605**
At the end of course student will able to	
CO 1	Understand the need as well as socail and economic impact as well as application of automation in the field of machine tool based manufacturing with help of literature and existing models
CO 2	Create building blocks for complicated engineering problems using basic existing engineering solutions with different standards and codes
CO 3	Apply the knowledge of various elements of manufacturing automation such as ,sensors to design and develop cost effective alternative solutions for indusial problems
CO 4	Document, analyze various automated flowlines, assembly systems and line balancing methods and create results using mathematical and statistical tools
CO 5	Learn about existing Advance mathematical and simulation techniques, computer aidded design and manufacturing softwares

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1		1	1	1	1	3	1	2		1	2	3	1	
CO2		2	2		2	2	2	2			2			2
CO3	2	1	1	1	2		3			1	2	1		
CO4	3	2	1	3	2				1	3	3	2		
CO5	2	1		1	2					2		2	1	
Average	2.33333	1.4	1.25	1.5	1.8	2.5	2	2	1	1.75	2.25	2	1	2

Course Name :Composite Materials	Course Code : 102609
At the end of course student will able to	
CO 1	Identify the various matrices, reinforcements and their combinations in composite materials.
CO 2	Select appropriate composite materials as per industrial applications.
CO 3	Apply simulation tools and mathematical approaches to design suitable composite material as per industrial requirement
CO 4	Choose various combinations of fibres and resins.
CO 5	Design and develop experimental methods for producing economic composite material which are suitable for environment and society

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	3	2		1							2	3	1	
CO2	3	2	1	1						1	2	2	2	
CO3	3	1	1	1						1	2	2		2
CO4	3	2	1	1						1	2	3		2
CO5	3	2	1	1						1	2	2		1
Average	3	1.8	1	1	0	0	0	0	0	1	2	2.4	1.5	1.66667

Course Name : **Power Plant Engineering**	Course Code : **102610**
At the end of course student will able to	
CO 1	Understand the need of powerplant for economic and socail upliftment of nation, its advantages,demerits and limitation.
CO 2	Apply mathematical and scientific approach to analyze the related thermodynamic processes and cycle of diffrent type of powerplants .
CO 3	study and analyze alternative solutions for power generation such as nuclear power plant, geothermal power plant keeping econonomic, environmental,socail aspects following international and national safety standards in mind.
CO 4	Study and Develop different sustainable methods to tackle and handle dust and pollutants produced during power generation.
CO 5	Undersand load curve and other related parameters crucial in design analysis and operation of power-plant layout and calculation of power tarrifs.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1	1	1	1	1	2	2	3			1	1	2	1	
CO2	3	2	1	2	2	2				2				2
CO3	2	3	3	2	1	2	3	3	1	2	2	2		3
CO4	2	2	2	2	1	2	2			2	1	2	2	2
CO5	2	1	1	2						1	3		2	
Average	2	1.8	1.6	1.8	1.5	2	2.66667	3	1	1.6	1.75	2	1.66667	2.33333

Course Name : **Renewable Energy Systems**	Course Code : **102611**
At the end of course student will able to	
CO 1	Understand the importance ofenergyconversion and the fundamental principles of renewable energy sources.
CO 2	Understand physics behind the solar energy operation and its characteristics and its socail economic impact.
CO 3	Comprehend the design and operation of wind energy systems as per national and international standards
CO 4	Analyse the hydro energy principles and its applications.
CO 5	Gain knowledge of biomass energy sources, including biofuels, biogas, and the technology for converting biomass into energyand its socail economic impact. .

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
CO1		1	1	1			3	2		1	3	3	1	
CO2	2	2	1		2	2	3			1	2	2		
CO3	3	2	2	1	2	2	1	2	1	3	2	3		1
CO4	3	2	1	3	2	3	1	2		2	2	2		2
CO5			1	1		2	2	2			3	2	2	1
Average	2.66667	1.75	1.2	1.5	2	2.25	2	2	1	1.75	2.4	2.4	1.5	1.33333

Course Name : **Design of Machine Elements(Practical)**	Course Code : **102601P**
At the end of course student will able to	
CO 1	Apply design procedure for design of cotter joint and knuckle joint and formulate the design procedure and acquire skill of finding processing area against failure.
CO 2	Apply the knowledge of design Data Hand book and ISO standards for selection of materials, strength and standard dimensions of design components
CO 3	Design shafts and keys subjected to direct and combined loading of given load and conditions.
CO 4	Design appropriate and efficient riveted joint for given loads and condition and analyse analytical results which design software.
CO 5	Apply design procedure for finding the maximum force the given power screw can lift and able to design various components of screw Jack with the help of safe design consideration.
CO 6	Identify the factors for engineering components design and analyse various members subjected to direct stress.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	3	2	1	2	1					1			1	
C02		1	1							1			1	1
C03	2	2	1							1				
C04	3	2	1	2	1					1				1
C05	3	2	1	2	2					2				
C06	3	2	1	2	1					1				
Average	2.8	1.83333	1	2	1.25					1.16667			1	1

Course Name : **Dynamics of Machinery(Practical)**	Course Code : **102602P**
At the end of course student will able to	
CO 1	Understand application various types of Links, Pairs, Chain and Mechanism
CO 2	Construct velocity diagram for Slider Crank Mechanism.
CO 3	Find coefficient of friction between belt and pulley used in power transmission
CO 4	Plot follower displacement Vs cam rotation graph for various cam follower arrangement.
CO 5	Apply design procedure for finding the maximum force the given power screw can lift and able to design various components of screw Jack with the help of safe design consideration.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	3	2	1	2	1					1			1	
C02		1	1							1				2
C03	2	2	1							1			1	
C04	3	2	1	2	1					1			1	

C05	3	2	1	2	2					2			1	
C06	3	2	1	2	1					1				1
Average	2.8	1.83333	1	2	1.25					1.16667				

Course Name : **Manufacturing Technology(Practical)**		Course Code : **102603P**												
At the end of course student will able to														
CO 1	Understand need, working and utility of various measuring instruments, and to impart practical knowledge of measurements and their ethical usage.													
CO 2	Analyze gear tooth profile using gear tooth Vernier/Gear tooth micrometer and discuss reasons in team													
CO 3	Measure length and angles using line-graduated instruments, i. e. vernier callipers, micrometers, bevel protractor, sine bar and surface plates and share data with group members													
CO 4	Evaluate the surface roughness using mechanical comparator/Tally surf for different models and present average result obtained by team.													
CO 5	Apply basic principal of engineering and science to calculate cutting forces exerted in various machining processes and their determination using .													
	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01	0	1	1	1	0	0	1	3	0	1	0	3	0	0
C02	3	2	0	3	3	2	1	0	2	2	1	2	1	0
C03	3	1	1	3	3	2	1	0	2	1	1	2	1	0
C04	3	2	1	3	3	2	1	0	2	2	1	2	0	1
C05	2	1	1	3	1	0	2	0	0	1	1	2	0	0
Average	2.2	1.4	0.8	2.6	2	1.2	1.2	0.6	1.2	1.4	0.8	2.2	0.4	0.2

Course Name : **Automation in Manufacturing(Practical)**		Course Code : **102605P**												
At the end of course student will able to														
CO 1	Understand the socail, ethical and economical impact of automation in manufacturing with help of case study.													
CO 2	Identify various type of automation tool and their various applications and limitations													
CO 3	Create simple robot programs useful for industrial requirement useful for socail upliftment													
CO 4	Apply various computer aided quality control techniques and emerging tools to enhance productivity of any industry.													
CO 5	Implement statstical method and industrial philosophies such as GT, CAPP and FMS in industries to analayze and document different parameters related to industry.													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	0					1	1	3		
CO2	1	1	1	1	2	2	2	0			0	2	1	
CO3	2	1	2	1	3			0		0	0	2	1	
CO4	2	2		1	3			0		1	2	2		1

CO5		0	1	3	2			0	3	3				
Average	1.5	1	1.25	1.4	2	2	2	0	3	1.25	0.75	2.25	1	1

SEMESTER - VII

Course Name : **Internal Combustion Engines** Course Code : **102701**

At the end of course student will able to

CO 1	Understand various types of Internal Combustion engine, engine parts, strokes and working principle.
CO 2	Apply the concept of thermodynamics to air- standard cycle in IC engine and analyze the effect of various operating parameters on IC engine performance.
CO 3	Analyze the characteristics of IC engine fuel and evaluate combustion emission phenomena of this fuels in IC engine.
CO 4	Differentiate among various types of fuel injection system and its effect on performance of SI and CI engine.
CO 5	Analyze various types of ignition system and lubrication system and its effect on thermal efficiency of IC engine

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		1		1						3			1	
CO2	3	3		2						3		1	2	
CO3	3	3		2						3		1		1
CO4	3	3		2						3		1		2
CO5	3	3		2						3		1		1
Average	3	2.6	0	1.8	0	0	0	0	0	3	0	1	1.5	1.33333

Course Name : **Refrigeration and Air Conditioning** Course Code : **102702**

At the end of course student will able to

CO 1	Understand operation simple VCRS, VARS, analysis of VCRS. Refrigerant properties, nomenclature, environmental issues associated with it, alternate refrigerants.
CO 2	Analyze of compound VCRS & multiple evaporator systems, types and working of basic components of VCRS ie. Compressors, condensers, expansion devices, evaporators, methods of defrosting, various R & AC controls.
CO 3	Understand working and analysis of various air cycle refrigeration systems, other refrigeration techniques like steam jet refrigeration, thermoelectric refrigeration, vortex tube.
CO 4	Apply principal of psychrometrics, properties & processes and to design calculations for air conditioning systems & various heating load calculations.
CO 5	Describe working of air transmission systems and air distribution systems, to understand methods of duct design and air conditioning controls.

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

CO5		1	1	2	2			2	1	3	1	3		1
Average	2.25	1.8	1.2	1.8	2	3	2.33333	2	1	1.8	1.2	2.2	1	1.33333

Course Name : **Automobile Engineering**		Course Code : **102705**
At the end of course student will able to		
CO 1	Understand the function of each automobile component.	
CO 2	Evaluate overall vehicle performance.	
CO 3	Apply the concept of moving off devices to achieve ideal traction.	
CO 4	Relate the existing fuels with alternate fuels.	
CO 5	Realise and understand the function of automobile modals.	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2		1	1	1	2	1			1		1	1	
CO2	2		1	2	2					2		2	2	
CO3			1		2	2	1			1				1
CO4	2	1	1	1		2	3			1		2		2
CO5				2	1					3		2		1
Average	2	1	1	1.5	1.5	2	1.66667	0	0	1.6	0	1.75	1.5	1.33333

Course Name : **Operations Research**		Course Code : **102706**
At the end of course student will able to		
CO 1	Understand the need of different types of optiztion techniques for various real life industrial and socail problems.	
CO 2	Define and formulate linear programming problems and solve deterministic and probabilistic inventory management models for known and unknown merchandise demand.	
CO 3	Information about building the network and finding the critical path, as well as the total duration and cost of the project.	
CO 4	Understand, build and solve transport models and assignment models.	
CO 5	Apply dynamic programming to solve problems involving discrete and continuous variables.	

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

Average	2	1.4	1.4	1.5	2.66667	2.5	1.5	2		1.5	1.5	2	1.5	1.66667

Course Name : **Summer Entrepreneurship-III**	Course Code : **100702P**
At the end of course student will able to	
CO 1	Advance their skills in competitive analysis and iteration while utilizing design thinking and experimental approach.
CO 2	Identify and secure customers, stakeholders, and team members through networks, primary customer research, and competitive and industry analysis.
CO 3	Improve problem-solving skills and communicatiion by working in industrial enviroonment.
CO 4	Create engineering solutions for real life industrial or socail problem using knowledge earned throughout the program.
CO 5	Create oral and visual presentation skills build confidence in the skills necessary to cause others to act.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01			1	3	3				1	1		3	1	
C02	1	2	2	1			1		3	1	3	2	1	1
C03	2	1	1	1	3	3	3	3	2	1	3	2	1	1
C04	3	2	2	1	3	2	2		1		3		1	1
C05				1	1					1	3		1	
Average	2	1.66667	1.4	1.4	3	2.5	2	3	1.6	1.5	3	2.33333	1	1

Course Name : **Project-I**	Course Code : **100709P**
At the end of course student will able to	
CO 1	Undertake problem identification, formulation and solution.
CO 2	Design engineering solutions to complex problems utilising a systems approach.
CO 3	Communicate with engineers and the community at large in written an oral forms.
CO 4	Compile relevant data, interpret & analyze it and test the hypotheses wherever applicable.
CO 5	Demonstrate the knowledge, skills and attitudes of a professional engineer.

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

Average	1.4	1.6	2.2	2	2	2	1.6	2	2	2.2	2.4	2.2	1.4	1.4

Course Name : **Internal Combustion Engines(Practical)**	Course Code : **100101**
At the end of course student will able to	
CO 1	Understand the working principle of various parts of Internal Combustion Engine and distinguish between SI and CI engine.
CO 2	Analyse a fuel characteristics such as colourful value flashpoint and fire point of SI and CI engine fuels.
CO 3	Understand actual valve timing diagram of four stroke SI and CI engines.
CO 4	Develop a heat balance sheet after performance of SI and CI engine with various performance parameters.
CO 5	Analyse the performance of multi cylinder engines with the variations of various parameters such as load and speed and evaluate indicated power and friction power of SI engine.

	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PS01	PS02
C01		1		1						3				
C02	3	2		1						3		1		
C03	1	1		1						3				
C04	3	2	1	2	1					3		1		
C05	3	2		2						3		1		
C06	3	2	1	1	1	2	1			3		1		
Average	2.6	1.66667	1	1.33333	1	2	1			3		1		

SEMESTER - VIII

Course Name : **Design of Transmission Systems**	Course Code : 102802
At the end of course student will able to	
CO 1	Design economoicfand safe belt drives (flat belt, V-belt), chain drives, rope drives, belt drive pulleys & chain sprockets.
CO 2	Apply the principle of Spur & Helical gear design for industrial application.
CO 3	Solve Bevel, Worm gear and cross helical gear considering design parameters as per design standards.
CO 4	Design economic various gear boxes (sliding mesh, constant mesh, multispeed) through geometric progression, standard step ratio, ray diagram, kinematics layout keeping industrial safety under consideration.
CO 5	Design various cams, clutches, internal and external shoe brakes using basic knowledge acquired from earlier studies.

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

CO4	3	2	2	1	2		2			2	2	2		2
CO5	3	3	3	1	2		2			2	1	2		1
Average	3	2.2	1.8	1	2	3	2	2	1	2	1.4	2	2	1.6

Course Name : **Gas Dynamics and Jet Propulsion**	Course Code : **102802**
At the end of course student will able to	
CO 1	Identify and understand difference between compressible and imcompressible flow and further study mach number to analyze stagnatioin properties of fluid flow.
CO 2	Derive mass momentum and energy equations for compressible flow using basic physics and thermodynamics law thus analyze isentropic flow through variable area duct.
CO 3	Calculate and anallyze effect of the flow parameters across normal and oblique shock wave applying engineering knowledge keeping environmental issues and personal safetey in conideration.
CO 4	Understand the principal of jet propulsion and differentiate between jet propulsion engine on basis of their operating principle and cycle.
CO 5	Explain theorey, principal and elements of rocket prupulsion system and evaluate its performance .

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	2		2			1	1	3	1	2
CO2	3	1	1	3	2					2	1	2		2
CO3	3	1	1	1	2	3	3			2	2	1		1
CO4		2	1	1	2		2			1	1	2	1	
CO5			1	1	2	2			2	1	3	1	3	1
Average	3	1.6	1	1.6	2	3	2.33333	2	1	1.8	1.2	2.2	1	1.5

Course Name : **Safety Management**	Course Code : **102807**
At the end of course student will able to	
CO 1	Analyse the need of Modern Safety norms.
CO 2	Comprehend the fundamental principles of safety management, including risk assessment, hazard identification, and the importance of safety culture.
CO 3	Learn to apply techniques for identifying potential hazards, assessing risks, and prioritizing safety interventions.
CO 4	Learn and apply the rules and guidelines on risk assessment and management.
CO 5	Select appropriate control methodologies based on the hierarchy of controls.

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

CO5		1	2	1	1	3		3	1	1	1	1		1
Average	2	1.5	1.2	1	1	3	3	3	1.8	1.6	2.4	1.75	1	1.5

Course Name : **Non-Conventional Manufacturing**						Course Code : **102808**							
At the end of course student will able to													
CO 1	Identify need of non-conventional manufacturing processes over conventional manufacturing processes and classify the various non-traditional machining processes on basis of their principle of working .												
CO 2	Identify important process parameters and scientific principals associated with various non-traditional machining processes.												
CO 3	Explain the effect of process parameters on performance characteristics like material removal rate and surface finish etc.												
CO 4	Understand the industrial applications as well as social-ecomical effect of different non-traditional manufacturing processes												
CO 5	Apply principal of physics in mathematical modelling of various non traditional manufacturing process												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		2	2	1	2					1	1	3	1	
CO2	2	3	2	1	3		1		1	2	1	2	2	1
CO3	2	3	1	3	1				1	3			2	1
CO4		1	1	2	2	3	2	2	1	1	2	1		2
CO5	3	2	1	2	3				1	3				1
Average	2.33333	2.2	1.4	1.8	2.2	3	1.5	2	1	2	1.33333	2	1.66667	1.25

Course Name : **Project-II**						Course Code : **102808**							
CO 1	Develop skills in project management, research, problem-solving, and applying theoretical knowledge to practical scenarios.												
CO 2	Design engineering solutions to complex problems utilising a systems approach.												
CO 3	Communicate with engineers and the community at large in written an oral forms.												
CO 4	Apply the theoretical concepts to solve industrial problems with teamwork and multidisciplinary approach.												
CO 5	Reflect and evaluate on experiences that might lead to future employment.												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	2	2		1		1	3	2	1	2	2
CO2	2	2	3	3	3	2	3	2	1	2	2	2	2	1
CO3	1	1	2	2	1	2	1		3	2	3	3	1	2
CO4	2	2	2	2	3		2		2	3	2	2	1	1
CO5	1	1	2	1	1	2	1		3	1	3	3	1	1
Average	1.4	1.6	2.2	2	2	2	1.6	2	2	2.2	2.4	2.2	1.4	1.4