DEPARTMENT OF MECHANICAL ENGINEERING

COURSE OUTCOMES (COS) OF ALL COURSES FRAMED UNDER

JNTUA-R15 REGULATION

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B.Tech I – I Semester (ME)

COURSE NAME: FUNCTIONAL ENGLISH

COURSE CODE: 15A52101

CO No.	COURSE OUTCOME
2101:1	Have improved communication in listening, speaking, reading and writing skills in general
2101:2	Have developed their oral communication and fluency in group discussions and interviews
2101:3	Have improved awareness of English in science and technology context.
2101:5	Have achieved familiarity with a variety of technical reports

COURSE NAME: MATHEMATICS – I

COURSE CODE: 15A54101

CO No.	COURSE OUTCOME
4101:1	The students become familiar with the application of differential and integral calculus, ordinary differential equations and vector calculus to engineering problems.
4101:2	The students attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications

COURSE OUTCOMES

COURSE NAME: COMPUTER PROGRAMMING

COURSE CODE: 15A05101

CO No.	COURSE OUTCOME
5101:1	Apply problem solving techniques in designing the solutions for a wide-range of problems
5101:2	Choose appropriate control structure depending on the problem to be solved

5101:3	Modularize the problem and also solution

COURSE NAME: ENGINEERING CHEMISTRY

COURSE CODE: 15A51101

CO No.	COURSE OUTCOME
1101:1	Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially.
1101:2	Understand the electrochemical sources of energy
1101:3	Understand industrially based polymers, various engineering materials

COURSE NAME: ENVIRONMENTAL STUDIES

COURSE CODE: 15A01101

CO No.	COURSE OUTCOME
1101:1	Students will get the sufficient information that will clarify modern environmental concepts like equitable use of natural resources, more sustainable life styles etc
1101:2	Students will realize the need to change their approach so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning.
1101:3	Students become conversant with the fact that there is a need to create a concern for our environment that Bwill trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
1101:4	By studying environmental sciences, students is exposed to the environment that enables one to find out solution of various environmental problems encountered on and often
1101:5	At the end of the course, it is expected that students will be able to identify and analyze environmental problems as well as the risks associated with these problems and efforts to be taken to protect the environment from getting polluted. This will enable every human being to live in a more sustainable manner

COURSE NAME: ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) LAB

COURSE CODE: 15A52102

CO No.	COURSE OUTCOME
2102:1	Become active participants in the learning process and acquire proficiency in spoken English. •
2102:2	Speak with clarity and confidence thereby enhance employability skills

COURSE NAME: ENGINEERING CHEMISTRY LAB

COURSE CODE: 15A51102

CO No.	COURSE OUTCOME
1102:1	Would be confident in handling energy storage systems and would be able combat chemical corrosion
1102:2	Would have acquired the practical skill to handle the analytical methods with confidence.
1102:3	Would feel comfortable to think of design materials with the requisite properties
1102:5	Would be in a position to technically address the water related problems.

COURSE NAME: COMPUTER PROGRAMMING LAB

COURSE CODE: 15A05102

CO No.	COURSE OUTCOME
5102:1	Apply problem solving techniques to find solutions to problems • •
5102:2	Able to use C language features effectively and implement solutions using C language.
5102:3	Improve logical skills.

B.Tech I – IISemester (ME)

COURSE NAME: ENGLISH FOR PROFESSIONAL COMMUNICATION

COURSE CODE: 15A52201

CO No.	COURSE OUTCOME
2201:1	Have acquired ability to participate effectively in group discussions
2201:2	Have developed ability in writing in various contexts
2201:3	Have acquired a proper level of competence for employability.

COURSE NAME: MATHEMATICS – II

COURSE CODE: 15A54201

CO No.	COURSE OUTCOME
4201:1	The student gains the knowledge to tackle the engineering problems using the concepts of Fourier series, various transforms and partial differential equations.

COURSE NAME: MATERIAL SCIENCE AND ENGINEERING

COURSE CODE: 15A03201

CO No.	COURSE OUTCOME
3201:1	get knowledge on bonds of solids and knowing the crystallization of metals. By knowing the grain size and shape through the crystallization, he may understand the effect of grain boundaries on the properties of metals and finally he determines the grain size that is very essential for analyzing the microstructures of metals
3201:2	Students will be able to construct the equilibrium diagrams by experimental methods and knowing all types of equilibrium diagrams isomorphs alloy systems , electric systems, pertectic systems solid-state transformations etc. while studying all these diagrams he may able to know about lever
3201:3	learn the structure and properties of all cast irons, steels and Non-ferrous metal alloys of copper, Al and Titanium. Students are advised to visit any Machine shop in the industries like SAIL, Visakhapatnam steel plant etc)

3201:4	learn the methods of different heat treatments i.e. annealing, normalizing and hardening. He also learns the different of alloying elements on Iron-Iron carbon system, the importance of TTT diagrams, Harden ability that are very essential for melting science
3201:5	understand the importance of advanced composite materials in application to sophisticated machine and structure of components, These composite materials helps to develop the components with required properties which we cannot attain using the metals & metal alloys.

COURSE NAME: ENGINEERING PHYSICS

COURSE CODE: 15A56101

CO No.	COURSE OUTCOME
6101:1	The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.
6101:2	The important properties of crystals like the presence of long range order and periodicity, structure determination using Xray diffraction are focused along with defects in crystals and ultrasonic non-destructive techniques.
6101:3	The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.
6101:4	The electronic and magnetic properties of materials were successfully explained by free electron theory and the bases for the band theory are focused.
6101:5	The properties and device applications of semiconducting and magnetic materials are illustrated

COURSE NAME: ENGINEERING DRAWING

COURSE CODE: 15A03101

CO No.	COURSE OUTCOME
3101:1	Drawing 2D and 3D diagrams of various objects.
3101:2	Learning conventions of Drawing, which is an Universal Language of Engineers.

CO No.	
3101:3	Drafting projections of points, planes and solids.

COURSE NAME: MATERIAL SCIENCE and ENGINEERING LAB

COURSE CODE: 15A03202

CO No.	COURSE OUTCOME
3202:1	Identify various microstructures of ferrous and non-ferrous metals and alloys. (L3)
3202:2	Visualize grains and grain boundaries. (L3)
3202:3	Importance of hardening of steels. (L2)
3202:4	Evaluate hardness of treated and untreated steels. (L4)

COURSE NAME: ENGINEERING PHYSICS LABORATORY

COURSE CODE: 15A56102

CO No.	COURSE OUTCOME
6102:1	Would recognize the important of optical phenomenon like Interference and diffraction.
6102:2	Would have acquired the practical application knowledge of optical fiber, semiconductor, dieclectric and magnetic materials, crystal structure and lasers by the study of their relative parameters.

COURSE NAME:IT WORKSHOP

COURSE CODE: 15A99201

CO No.	COURSE OUTCOME
9201:1	Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
9201:2	Prepare the Documents using Word processors and Prepare spread sheets for calculations .using excel and also the documents using LAteX
9201:3	Prepare Slide presentations using the presentation tool
9201:4	Interconnect two or more computers for information sharing.

9201:5	Access the Internet and Browse it to obtain the required information.

B.Tech II – I Semester (ME)

COURSE NAME: MATHEMATICS-III

COURSE CODE: 15A54301

CO No.	COURSE OUTCOME
4301:1	able to analyze engineering problems using the concepts of Matrices and Numerical methods.

COURSE NAME: MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

COURSE CODE: 15A52301

CO No.	COURSE OUTCOME
2301:1	Get the basic inputs of Managerial Economics and demand concept and able to estimate the future demand of a product. (BTL2)
2301:2	Explain the concepts of cost and production and can calculate the breakeven point.(BTL2)
2301:3	Learn how to take effective decisions under various market situations and also about different forms of business organizations.(BTL2)
2301:4	Get the inputs of accounting concepts and analyze the financial statements.(BTL4)
2301:5	Know how to take an effective investment decision.(BTL2)

COURSE NAME: MECHANICS OF SOLIDS

COURSE CODE: 15A01308

CO No.	COURSE OUTCOME

1308:1	measure the strength of materials based on calculating stresses, strains and deformations for basic geometries subjected to axial loading and thermal effects
1308:2	draw shear force and bending moment diagrams for calculating maximum shear force and maximum bending moment for different types of beams with different lateral loadings conditions
1308:3	strength of the beams with different sections by bringing the relationship between the bending stress and maximum bending moment, bringing the relationship between the shear stress and maximum shear force which are calculated from previous unit
1308:4	calculate the shear strength of the solid and hallow shafts which are subjected to torsional loading in power transmitting
1308:5	calculate different stresses and strains for the thin and thick cylinders in identifying safe design for boiler shells and thick shells as such in like domestic cylinders, air compressor and high pressure vessels used in thermal plants etc

COURSE NAME: ENGINEERING DRAWING

COURSE CODE: 15A03301

CO No.	COURSE OUTCOME
3301:1	Draw various curves applied in engineering.
3301:2	Show projections of points, lines, planes and solids graphically.
3301:3	Draw the development of surfaces of solids.

COURSE NAME: ENGINEERING MECHANICS

COURSE CODE: 19A03302

CO No.	COURSE OUTCOME
3302:1	Resolve forces and couples in mechanical systems. (L3)
3302:2	Identify the frictional forces and its influence on equilibrium. (L3)
3302:3	Find the centre of gravity and moment of inertia for various geometric shapes (L3)

3302:4	Develop equations for different motions. (L4)
3302:5	Determine the displacement, velocity and acceleration relations in dynamic systems (L4)

COURSE NAME: THERMODYNAMICS

COURSE CODE: 15A03303

CO No.	COURSE OUTCOME
3303:1	Understand the importance of thermodynamic properties related to conversion of heat energy into work. (BTL1)
3303:2	Apply the laws of thermodynamics to boilers, heat pumps, refrigerators, heat engines, compressors and nozzles. (BTL3)
3303:3	Utilize steam properties to design steam based components (BTL4)
3303:4	Introduce the concept of available energy for maximum work conversion. (BTL5)
3303:5	Analyze thermodynamic relations and air standard cycles (BTL4)

COURSE NAME: COMPUTER AIDED DRAFTING LAB

COURSE CODE: 15A03304

CO No.	COURSE OUTCOME
3304:1	Demonstrate the conventional representations of materials and machine components. (BTL2)
3304:2	Model riveted, welded and key joints using CAD system. (BTL4) Create solid models and sectional views of machine components. (BTL6)
3304:3	Generate solid models of machine parts and assemble them. (BTL6)
3304:4	Translate 3D assemblies into 2D drawings. (BTL4)
3304:5	Create manufacturing drawing with dimensional and geometric tolerances. (BTL6)

B.Tech II – II Semester (ME)

COURSE NAME: PROBABILITY AND STATISTICS

COURSE CODE: 15A54401

CO No.	COURSE OUTCOME
4401:1	Analyze the problems of engineering & industry using the techniques of testing of hypothesis, Statistical Quality Control and Queuing theory and draw appropriate inferences.

COURSE NAME: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE CODE: 15A99301

CO No.	COURSE OUTCOME

	basics of Electrical Circuits, Network theorems, two port networks, DC generators & motors, Transformers, Induction motors and Alternators.
9301:1	

COURSE NAME: MACHINE DRAWING

COURSE CODE: 15A03401

CO No.	COURSE OUTCOME
3401:1	Students will acquire skills to draft on a drawing sheet without much effect. Students are advised to visit machine shop.
3401:2	These drawings can be easily prepared and understood by both the people in a manufacturing industry and the consumers too. Students are advised to visit machine shop.
3401:3	able to produce the final product by procuring the units from various sources/suppliers and still produce any useful product serving effectively. It is not necessary that all the components to be made locally only.

COURSE NAME: KINEMATICS OF MACHINERY

COURSE CODE: 15A03402

CO No.	COURSE OUTCOME
3402:1	An understanding of concepts of different of mechanism with lower pairs and higher pairs.(BTL1)
3402:2	Gain the knowledge of different types of straight line motion mechanism and steering gear mechanisms.(BTL6)
3402:3	Obtain an in depth knowledge of finding displacement, velocity and acceleration of different points on different mechanisms using different methods(relative velocity, Instantaneous methods(BTL3)
3402:4	Acquire the knowledge on different gear profiles and calculating the different parameters of gears. (BTL3)
3402:5	Design and analyze different cam profile for different types of followers and various gear trains.(BTL3) .

COURSE NAME: THERMAL ENGINEERING – I

COURSE CODE: 15A03403

CO No.	COURSE OUTCOME
3403:1	know working of both S.I and C.I engines with the help of indicator diagrams. Student can differentiate the working of 2-S and 4-S engines and also can draw valve and port timing diagrams.
3403:2	understand the fuel supply systems, cooling, lubrication and ignition systems. Student can understand how auxiliary systems play key role in increasing the performance of an I.C engine.
3403:3	understand the flame propagation inside the cylinder, stages of combustion in S.I and C.I engines. Student can understand the knocking phenomenon
3403:4	familiar with indicated power, brake power and friction power and their methods of measurement
3403:5	differentiate the working of reciprocating and rotary air compressors. Student can calculate work done by single and multistage reciprocating air compressors

COURSE NAME: MANUFACTURING TECHNOLOGY

COURSE CODE: 15A03404

CO No.	COURSE OUTCOME
3404:1	Demonstrate different metal casting processes and gating systems. (L2)
3404:2	Classify working of various welding processes. (L2)
3404:3	Evaluate the forces and power requirements in rolling process. (L5)
3404:4	Apply the principles of various forging operations. (L3)
3404:5	Outline the manufacturing methods of plastics, ceramics and powder metallurgy. (L1)

COURSE NAME: THERMAL ENGINEERING LABORATORY

COURSE CODE: 15A03405

CO No.	COURSE OUTCOME
3405:1	To Explain different working cycles of engine (BTL1)
3405:2	To Describe various types of combustion chambers in IC engines (BTL2)
3405:3	To Illustrate the working of refrigeration and air conditioning systems (BTL3)
3405:4	To Evaluate the Heat Balance Sheet of IC engine. (BTL4)

COURSE NAME: MANUFACTURING TECHNOLOGY LABORATORY

COURSE CODE: 15A03406

CO No.	COURSE OUTCOME
3406:1	Resolve forces and couples in mechanical systems. (L3)
3406:2	Identify the frictional forces and its influence on equilibrium. (L3)

B.Tech III – I Semester (ME)

COURSE NAME: FLUID MECHANICS AND HYDRAULIC MACHINES

COURSE CODE: 15A03406

CO No.	COURSE OUTCOME
3406:1	Familiarize basic terms used in fluid mechanics (BTL1).
3406:2	Understand the principles of fluid statics, kinematics and dynamics (BTL1)
3406:3	Understand flow characteristics and classify the flows and estimate various losses in flow through channels (BTL1)
3406:4	Analyze characteristics for uniform and non-uniform flows in open channels (BTL4)
3406:5	Design different types of turbines, centrifugal and multistage pumps. (BTL4)

COURSE NAME: THERMAL ENGINEERING – II

COURSE CODE: 15A03501

CO No.	COURSE OUTCOME
3501:1	illustrate the power generation through Rankine cycle. Student can able understand efficiency enhancement methods of Reheating and regeneration.
3501:2	understand the working of different high pressure and low pressure boilers. Student can distinguish mountings and accessories. The student can calculate the chimney height for maximum discharge.
3501:3	able to distinguish the ideal flow and actual flow through nozzle. Student can know the importance of maximum discharge through nozzle
3501:4	able to distinguish the working of impulse and reaction turbines. Student can able to construct the velocity triangle and combined velocity triangle and can learn its importance in determining the power produced by the turbine.
3501:5	familiar with the basic components of a gas turbine power plant. Student can illustrate the power generation using Joule Cycle. Student can know the methods to increase the specific power output and efficiency of the cycle

COURSE NAME: Dynamics of Machinery

COURSE CODE: 19A03505

CO No.	COURSE OUTCOME
3505:1	Understand the effect of reactive gyroscopic couple on the stability of vehicles (BTL2)
3505:2	Understand the power lost and power transmitted due to friction (BTL2)
3505:3	Identify and correct the unbalances of rotating body (BTL1)
3505:4	Reduce the magnitude of vibration and isolate vibration of dynamic systems. (BTL1)
3505:5	Determine dimensions of Governors for speed control .(BTL1)

COURSE NAME: MACHINE TOOLS

COURSE CODE: 15A03503

CO No.	COURSE OUTCOME
3503:1	Choose cutting processes and variables. (l3) .Relate tool wear and tool life. (BTl1)
3503:2	Calculate the machining parameters for different machining processes. (BTl5)
3503:3	Identify methods to generate different types of surfaces. (BTl3)
3503:4	Explain work-holding requirements. (BTl2)
3503:5	Design jigs and fixtures. (BTl6)

COURSE NAME: DESIGN OF MACHINE MEMBERS – I

COURSE CODE: 15A03504

CO No.	COURSE OUTCOME
3504:1	capable to apply design procedures using theories of failure for different elements.
3504:2	o design simple components under cyclic loading using Goodman's and Soderberg's criterions.
3504:3	able to design riveted joints with different configuration, boiler shell joint design and eccentric loading design of riveted joints.
3504:4	able to design cotter joint, knuckle joint and shafts.
3504:5	able to design various rigid and flexible shaft couplings.

COURSE NAME: FLUID MECHANICS AND HYDRAULIC MACHINES LAB

COURSE CODE: 15A01511

CO No.	COURSE OUTCOME
1511:1	By performing the various tests in this laboratory the student will be able to know the principles of discharge measuring devices and head loss due to

	sudden contraction and expansion in pipes and working principles of various pumps and motors. **(BTL1).**
1511:2	Understand the bernoulis theorem (BTL2)
1511:3	Analysize hydraulic machines (BTL13)
1511:4	By performing the various tests in this laboratory the student will be able to know the principles of discharge measuring devices and head loss due to sudden contraction and expansion in pipes and working principles of various pumps and motors. **(BTL1).**
1511:5	Understand the bernoulis theorem (BTL2)

COURSE NAME: MACHINE TOOLS LABORATORY

COURSE CODE: 15A03508

CO No.	COURSE OUTCOME
3508:1	Identify techniques to minimize the errors in measurement(BTL1)
3508:2	Understand working of lathe, shaper, planner, drilling, milling and grinding machines. (BTL2)
3508:3	Comprehend speed and feed mechanisms of machine tools. (BTL5)
3508:4	Estimate machining times for machining operations on machine tools(BTL2)

B.Tech III – II Semester (ME)

COURSE NAME: OPERATIONS RESEARCH

COURSE CODE: 15A03601

CO No.	COURSE OUTCOME
3601:1	Develop mathematical models for practical problems. (l3)
3601:2	Apply linear programming to transportation problems. (l3)
3601:3	Solve games using various techniques. (l3)

CO No.	COURSE OUTCOME
3601:4	Solve production scheduling and develop inventory policies. (l6
3601:5	Apply optimality conditions for constrained and unconstrained nonlinear problems. (l3)
3601:6	apply dynamic programming methods. (L3)

COURSE NAME: DESIGN OF MACHINE MEMBERS– II

COURSE CODE: 15A03602

CO No.	COURSE OUTCOME
3602:1	able to design crane hooks, C-clamps and various belt, rope and chain drives.
3602:2	able to design helical sprigs for two wheel vehicle and laminated springs for trucks
3602:3	able to design journal bearings, ball bearings and roller bearings and to know the advantages of rolling contact bearings against sliding contact bearings.
3602:4	able to design spur and helical gears for different input conditions.
3602:5	able to know various forces acting on I C engine parts and failure criteria to be adopted for various parts.

COURSE NAME: HEAT TRANSFER

COURSE CODE: 15A03603

CO No.	COURSE OUTCOME
3603:1	To impart the basic laws of conduction, convection and radiation heat transfer and their applications (BTL2)
3603:2	To familiarize the convective heat transfer concepts (BTL4)
3603:3	To explain basics of radiation heat transfer (BTL5)
3603:4	To make conversant with the heat transfer analysis related to thermal systems like heat exchangers, evaporator, and condenser. (BTL5)
3603:5	

| | To understand the phenomenon of boiling and condensation to familiarize the mass transfer process   (BTL4) |

COURSE NAME: FINITE ELEMENT METHODS

COURSE CODE: 15A03604

CO No.	COURSE OUTCOME
3604:1	able to know introductory basic principles and approaches for solving FEM problems in different fields.
3604:2	able to formulate FEM model for simple problems.
3604:3	able to write interpolation functions to higher order isoparametric elements.
3604:4	able to derive element matrices for applying the principles to find stresses in beams and trusses and temperature distribution in composite walls and fins.
3604:5	able to solve bars, trusses, beams and heat transfer problems using FEM and also to apply boundary conditions in realistic problems.

COURSE NAME: METAL FORMING PROCESSES

COURSE CODE: 15A03605

CO No.	COURSE OUTCOME
3605:1	understand the basic concept on one, two and three dimensional stress analysis, theory of plasticity, strain hardening, hot and cold working process
3605:2	understand the principles of rolling and forging processes, their applications and defects
3605:3	understand the fundamentals of extrusion process and wire drawing processes and their industrial applications.
3605:4	understand the various press working processes, their advantages and disadvantages.
3605:5	understand the concept of plastic manufacturing process, rapid manufacturing process and its applications.

COURSE NAME: NONCONVENTIONAL SOURCES OF ENERGY

COURSE CODE: 15A03606

CO No.	COURSE OUTCOME
3606:1	Understanding various Non-conventional sources of Energy.
3606:2	Able to learn how to use renewable energies instead of conventional fuels

COURSE NAME: Heat Transfer Lab

COURSE CODE: 15A03609

CO No.	COURSE OUTCOME
3609:1	To Understand different modes of heat transfer (BTL1)
3609:2	To evaluate thermal conductivities of different materials (BTL4)
3609:3	To Gain knowledge about natural and force convection phenomenon (BTL5)
3609:4	Estimate experimental uncertainty in measurements (BTL5)
3609:5	To Understand different modes of heat transfer (BTL1)

COURSE NAME: COMPUTER AIDED ENGINEERING LAB (CAE LAB)

COURSE CODE: 15A03610

CO No.	COURSE OUTCOME
3610:1	Generate CAD models.
3610:2	Write CNC programs for various machining operations.

COURSE NAME: ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS

COURSE CODE: 15A52602

CO No.	COURSE OUTCOME
2602:1	Accomplishment of sound vocabulary and its proper use contextually

2602:2	Flair in Writing and felicity in written expression
2602:3	Enhanced job prospects.
2602:4	Effective Speaking Abilities

B.Tech I – I Semester (ME)

COURSE NAME: Management Science

COURSE CODE: 15A52601

CO No.	COURSE OUTCOME
2601:1	Understand the concepts & principles of management and know the designs of organizational structures. (BTL2)
2601:2	Apply the knowledge of Work-study principles & Quality Control techniques. (BTL3)
2601:3	Analyze the concepts of HRM in Recruitment, Selection and Training & Development. (BTL4)
2601:4	Evaluate PERT/CPM Techniques in project management& and Basic knowledge about Strategy formulation and implementation in enterprises. (BTL5)
2601:5	Understand the modern concepts in management like SCM, BPO, Six Sigma and TQM. (BTL2)

COURSE NAME: AUTOMOBILE ENGINEERING

COURSE CODE: 15A03701

CO No.	COURSE OUTCOME
3701:1	Illustrate working of IC engine components.(BTL1)
3701:2	Analyze the combustion phenomenon in S.I and C.I engines and various emission control methods. .(BTL1)
3701:3	Explain various elements and transmission system of an automobile.(BTL2)

3701:4	Explain, steering and suspension systems of an automobile.(BTL6)
3701:5	Describe the importance of safety systemand hybrid vehicle.(BTL2)

COURSE NAME: CAD/CAM

COURSE CODE: 15A03702

CO No.	COURSE OUTCOME
3702:1	Apply various transformations to manipulate a geometric model.(BTL3)
3702:2	Illustrate various entities of wire frame, surface, and solid models. (BTL1)
3702:3	Develop the CNC part programming for given component. (BTL2)
3702:4	Formulate manufacturing cells based on similar attributes of parts, Justify the need of computer aided quality control.(BTL2)
3702:5	Propose trends in manufacturing to improve the productivity. (BTL3)

COURSE NAME: METROLOGY AND MEASUREMENTS

COURSE CODE: 15A03701

CO No.	COURSE OUTCOME
3701:1	Understand the principles of measurement systems(BTL2)
3701:2	Design mechatronics system, control systems and microprocessor-based controllers(BTL4)
3701:3	Choose the appropriate instrument to measure the physical parameters like displacement, speed, stress and strain, force, torque, temperature and flow. (BTL1)
3701:4	Analyze the measurement data obtained from different measuring instruments for the same physical quantity.(BTL4)
3701:5	Illustrate on different metrological tools and perform measurements in quality impulsion. (BTL4)

COURSE NAME: Refrigeration and Air Conditioning

COURSE CODE: 15A03704

CO No.	COURSE OUTCOME
3704:1	To understand the thermodynamic principles are applied to the refrigeration and air conditioning industry.(BTL2)
3704:2	To learn how real systems used in commercial , industrial refrigeration and air conditioning industries are to be built-up. (BTL4)
3704:3	To impart the knowledge on various refrigeration methods like VCR, VAR and latest developments (BTL5)
3704:4	To analyze the various air conditioning methods like summer, winter and year round air conditioning (BTL5)
3704:5	To understand the practical applications of refrigeration and air conditioning systems. (BTL4)

COURSE NAME: AUTOMATION AND ROBOTICS

COURSE CODE: 15A03708

CO No.	COURSE OUTCOME
3708:1	Understand to know what is automation, types of automation, components of automation, strategies and levels of automation (BTL2)
3708:2	Understand the types of flow lines, quantitative analysis of flow lines, how the assembly is carried out on automated flow line without interruption and how to balance the line and flexible assembly lines (BTL2)
3708:3	Know the various components in the anatomy of robot. By knowing this the student may apply in the design of new robotic structure. (BTL1)
3708:4	Understand the applications of various types of end effectors, and sensor devices..(BTL2)
3708:5	Understand robot programming languages which may adopt in different applications of robot. (BTL2)

COURSE NAME: CAD/CAM LABORATORY

COURSE CODE: 15A03710

CO No.	COURSE OUTCOME
3710:1	Generate CAD models.
3710:2	Write CNC programs for various machining operations.

COURSE NAME: METROLOGY & MEASUREMENTS LABORATORY

COURSE CODE: 15A03711

CO No.	COURSE OUTCOME
3711:1	Study of sensors, Hydraulic and Pneumatic actuators and experiment ion of its characterization for industrial applications. (BTL2)
3711:2	Differentiate the accuracy of different instruments.. (BTL2)
3711:3	Analyze the measurement data obtained from different measuring instruments for the same physical quantity.(BTL4)
3711:4	Study of sensors, Hydraulic and Pneumatic actuators and experiment ion of its characterization for industrial applications. (BTL2)

B.Tech IV – II Semester (ME)

COURSE NAME: INDUSTRIAL ENGINEERING

COURSE CODE: 15A03801

CO No.	COURSE OUTCOME
3801:1	Explain the concepts, theories of management and organization
3801:2	Can Select the suitable plant layouts and plant location for production
3801:3	Determine to select best possible manufacturing procedures.
3801:4	Understand the different types of inventory models and its applicability

3801:5	Know the importance of inspection and quality standards in production

COURSE NAME: Gas Turbine and Jet Propulsion

COURSE CODE: 15A03805

CO No.	COURSE OUTCOME
3805:1	To understand the basic gas cycles of gas turbine (BTL2)
3805:2	To analyze the methods of regeneration, inter cooling and reheating of Brayton cycle of gas turbine (BTL4)
3805:3	To familiarize the concept of jet propulsion (BTL5)
3805:4	To analyze the working principle of jet engines (BTL5)
3805:5	To impart knowledge on the working of rockets (BTL4)