

COURSES SCHEME

FOR B.E.

MECHANICAL ENGINEERING

(PRODUCTION)

2017

SR. NO.	COURSE NO.	TITLE
1.	UPH004	APPLIED PHYSICS
2.	UTA007	COMPUTER PROGRAMMING - I
3.	UEC001	ELECTRONIC ENGINEERING
4.	UTA015	ENGINEERING DRAWING
5.	UHU003	PROFESSIONAL COMMUNICATION
6.	UMA003	MATHEMATICS-I
7.	UCB008	APPLIED CHEMISTRY
8.	UTA009	COMPUTER PROGRAMMING-II
9.	UEE001	ELECTRICAL ENGINEERING
10.	UEN002	ENERGY AND ENVIRONMENT
11.	UTA013	ENGINEERING DESIGN PROJECT-I
12.	UMA004	MATHEMATICS-II
13.	UES009	MECHANICS ^
14.	UTA014	ENGINEERING DESIGN PROJECT-II
15.	UTA002	MANUFACTURING PROCESSES
16.	UMA031	OPTIMIZATION TECHNIQUES
17.	UES010	SOLIDS AND STRUCTURES *
18.	UES011	THERMO-FLUIDS *
19.	UME306	MECHANICS OF MACHINE
20.	UES012	ENGINEERING MATERIALS
21.	UMA007	NUMERICAL ANALYSIS
22.	UME408	MACHINE DESIGN-I
23.	UME409	COMPUTER AIDED DESIGN & ANALYSIS
24.	UMT802	INDUSTRIAL AUTOMATION
25.	UME802	MECHATRONICS
26.	UPE501	WORK STUDY AND ERGONOMICS
27.	UME733	INDUSTRIAL METALLURGY
28.	UME705	MACHINING SCIENCE
29.	UME844	MACHINE TOOL DESIGN

30.	UME407	INSPECTION AND QUALITY CONTROL
31.	UTA012	INNOVATION & ENTREPRENEURSHIP
32.	UPE691	PROJECT SEMESTER*
33.	UPE697	GROUP PROJECT
34.	UPE601	FACILITY PLANNING
35.	UPE602	SUPPLY CHAIN MANAGEMENT
36.	UME502	AUTOMOBILE ENGINEERING
37.	UPE704	COMPUTER AIDED MANUFACTURING
38.	UPE702	METAL CASTING AND JOINING
39.		ELECTIVE I
40.	UPE893	CAPSTONE PROJECT (STARTS)
41.	UPE703	METAL FORMING
42.	UPE801	MICRO MACHINING PROCESSES
43.	UME836	OPERATIONS MANAGEMENT
44.	UHU005	HUMANITIES FOR ENGINEERS
45.		ELECTIVE -III
46.	UME847	RAPID PROTOTYPING
47.	UPE893	CAPSTONE PROJECT (COMPLETION)
48.	UME722	SYSTEM MODELLING AND SIMULATION
49.	UME805	ROBOTICS ENGINEERING
50.	UME832	FINITE ELEMENT METHOD
51.	UME721	TRIBOLOGY
52.	UME501	APPLIED THERMODYNAMICS
53.	UME513	DYNAMICS & VIBRATIONS
54.	UME712	HEAT TRANSFER
55.	UME713	FLUID MECHANICS & MACHINERY
56.	UPE831	PROCESSING OF POLYMERS AND COMPOSITES
57.	UEC742	MEMS
58.	UPE832	MANAGEMENT INFORMATION SYSTEMS
59.	UPE833	DESIGN OF EXPERIMENTATION AND ANALYSIS
60.	UHU006	Introductory course in French
61.	UCS001	Introduction to cyber security
62.	UHU007	Employability development skills

63.	UEN004	Technologies for sustainable development
64.	UHU008	Introduction to corporate finance
65.	UHU009	Introduction to cognitive science
66.	UPH063	Nano science and nano-materials
67.	UMA066	Graph theory and applications

UME705: MACHINING SCIENCE

L	T	P	Cr
3	1	2	4.5

Course Objectives: This course inculcates specialized knowledge and skill in machining processes using the principles and methods of engineering analysis and design. This course also cultivates the ability to develop and optimize the conventional machining processes resulting in creation and distribution of value in engineering applications. This course also imparts knowledge about the significance of optimal process parameters used for the optimal performance of various machining processes used in manufacturing industries.

Course Learning Outcomes (CLOs):

The students will be able to:

1. analyse the machining processes using Lee and Shaffer, Palmer and Oxley, Merchant's theories of machining
2. design the conditions for the maximum tool life and factors influencing surface quality, dimensional accuracy and material removal rate in machining.
3. identify the locating and clamping devices to be used for different machining processes
4. analyse the thermal and frictional aspects of machining parameters used in manufacturing industries

UME407: INSPECTION AND QUALITY CONTROL

L	T	P	Cr
3	1	2	4.5

Course Objectives: This course enables the students to understand the organization and procedures for industrial inspection. It helps in developing an understanding with regards to the basic concepts/ tools of quality engineering. The course helps to study the development, operational procedure, and applications of control charts to signify their role in quality control. The course enables the students to study, design and use acceptance sampling plans. The course introduces the concept of process capability analysis to gage process performance.

Course Learning Outcomes (CLOs):

The students will be able to:

1. identify and analyze the functions and organization of industrial inspection.
2. apply and analyze the seven Ishikawa's tools and conduct quality cost analysis.
3. analyze various control charts for quality control of the different production processes
4. evaluate through process capability studies if a given process is proficient in meeting customer's specifications
5. apply the basic concepts involved in the working of instruments for line and angle measurements.

UPE501: WORK STUDY AND ERGONOMICS ENGINEERING

L	T	P	Cr
3	1	0	3.5

Course objective:This course introduces the role of Work Study in the industry and how productivity issues in the industry can be addressed by the application of Work Study, while stimulating critical thinking on the techniques of Method Study and Work Measurement. The course also introduces the concept of conducting time studies and production studies to assess time standards and production standards for fulfilling production goals in an organization. The course further introduces the scope of ergonomics and the application of ergonomic principles to workplace design and work organisation and culminates with the concept of evaluating the impact of various human factors to design of safe workplace environment.

Course Learning Outcomes (CLOs):

The students will be able to:

1. develop a case for productivity improvement in any manufacturing or service industry scenario
2. independently conduct a method study in any organization with the objective of improving a process, material movement system or design of a work place
3. develop time standards for operations, identify production bottlenecks and improvise operations
4. apply principles of good ergonomic design of work areas and equipment
5. identify, explain and evaluate the impact of various personal attributes (anatomical, physiological and anthropometric) on proper safe working practice

**UPE697: GROUP
PROJECT**

L	T	P	Cr
-	-	-	13

Course Objectives: To develop design skills according to a Conceive-Design-Implement-Operate (CDIO) compliant methodology. To implement engineering skill and knowledge to complete the identified project work while encouraging creativity and innovation. To develop spirit of team work, communication skills through group-based activity and foster self-directing learning and critical evaluation.

Course Learning Outcomes (CLOs):

The students will be able to:

1. identify a problem based on the need analysis of community /industry/ research.
2. create a flowchart of methodology for solving the identified problem
3. demonstrate team work with work division, team meetings and communications among team members.
4. write technical report for the project work and present the same through power point presentations or posters.

UPE601: FACILITIES PLANNING

L	T	P	Cr
3	1	0	3.5

Course Objectives: This course introduces the concept of facility planning, its need and importance in the industry, factors affecting facility location decision, plant design, concept of line balancing, and material handling systems.

Course Learning Outcomes (CLOs):

The students will be able to:

1. upon completion of this module, students will be able to:
2. analyse an existing facility in context to its location and design.
3. develop a new plant layout or to improve an existing layout.
4. design/ re-design proposed a new material handling system.

UPE602: SUPPLY CHAIN MANAGEMENT

L	T	P	Cr
3	1	0	3.5

Course objectives: This course educates students about the concepts of and the role supply chain management by developing an understanding about markets, logistics, drivers of supply chain and matching supply and demand through planning, forecasting and replenishment.. The course further develops basic knowledge about competitive performance, network design, planning for inventories in supply chain and opportunities for growth. The course culminates with the introduction of concepts regarding synchronization and risk management in the supply chain.

Course Learning Outcomes (CLOs):

The student will be able to:

1. explore opportunities for cost reduction through Supply Chain efficiency,
2. assess demand versus supply and use it for aggregate planning
3. optimize product availability to improve revenue streams
4. assess performance of a supply chain – up stream as well as down stream
5. assess vulnerability in supply chains

UPE704: COMPUTER AIDED MANUFACTURING

L	T	P	Cr
3	1	2	4.5

Course Objectives: To introduce the students to the standard terminologies, conventions, processes, design and operational characteristics of key hardware components, programming techniques and applications of modern multi-axis computer numerical control (CNC) machining centers. To expose the students to automatic computer assisted CNC tool path programming and virtual simulation of toolpath data for CNC milling and turning centres using modern professional software.

Course Learning Outcomes (CLOs):

The students will be able to:

1. create plan for automatic machining of a given part on a multi-axis CNC machining center including selection of machining parameters, cutting tools, process sequence and controller settings for tool presets.
2. create and validate a CNC part program data using manual data input (MDI) for automatic machining of a given parts/ surface using a 2-axis turning center or 3-axis vertical milling center.
3. create and validate a CNC part program data using a commercial CAM package for automatic machining of precision parts or part surface for a multi-axis CNC machining centre.
4. produce an industrial component from given 3D part model/ 2D part drawings using CNC machining centers through programming, setup, and ensuring safe operation of automatic machine tools.

UPE703: METAL FORMING

L	T	P	Cr
3	1	0	3.5

Course Objectives: This course imparts knowledge and principles for deciding yielding criteria during forming of metals, analysis of different bulk metal forming processes using different analysis approach. The course also helps to analyze and understand the process mechanics during different metal forming processes and reflects the importance of various controlling process parameters in determining force, power requirements etc.

Course Learning Outcomes (CLOs):

1. decide yielding of a material according to different yield theory for a given state of stress.
2. analyze the different bulk metal forming process mechanics using different analysis approach and calculate the force, power requirements etc.
3. calculate the die and punch sizes for different sheet metal operations and to calculate the required load for the process.
4. evaluate the effect of process parameters on the process mechanics during bulk metal forming.

UPE702: METAL CASTING AND JOINING

L	T	P	Cr
3	1	2	4.5

Course Objectives: To inculcate the principle, thermal and metallurgical aspects during solidification of metal and alloys. To impart knowledge about principles/methods of casting with detail design of gating/riser system needed for casting, defects in cast objects and requirements for achieving sound casting. To impart knowledge about welding behavior of machine and process during welding, analysis of common and newer welding techniques and metallurgical and weldability aspects of different common engineering materials.

Course Learning Outcomes (CLOs):

The student will be able to:

1. analyze the thermal aspects during solidification in casting and their role on quality of cast
2. design the gating and riser system needed for casting and requirements to achieve defect free casting.
3. analyze the welding process behavior of common and newer welding techniques
4. analyze the requirements to achieve a sound welded joint of engineering materials.

**UPE893: Semester VII Part-I (Starts) 0 0 2 ---- UPE893: Semester VIII Part-II
(Completion)**

Course Objectives: A design project based course to implement integrated approach to the design of mechanical systems using concepts of mechanical design, thermal and manufacturing courses studied in the previous semesters. Design a mechanical system from component level to assembly using CAD and CAE tools individually or in a team and generate a design project report with production drawings using drawing standards, symbols, conventions and rules. Plan the production of a mechanical system given the detailed drawings. Schedule and execute a production plan for the components and assemble the working prototype of the mechanical system. Analyse the prototype manufactured for improvement in design, manufacturing and function.

Course Learning Outcomes (CLOs):

The students will be able to:

1. design a mechanical system implementing an integrated system design approach applying knowledge accrued in various professional courses.
2. work in a design team lead by a team leader and demonstrate team work.
3. design, analyze and optimize the design of a mechanical system considering various requirements like reliability, fatigue loading, optimized design, manufacturing, assembly, installation, maintenance, cost and transportation-to-site aspects, use of design standards, industry standards.
4. create production drawings for mechanical components and systems using manual drafting and CAD tools following relevant standards and conventions.
5. read production drawings for mechanical components and systems and plan a production based on it.
6. use suitable manufacturing and fabrication processes for manufacturing a prototype.
7. assemble a mechanical system after manufacturing its components and analyze its working.

UPE801: MICRO MACHINING PROCESSES

L	T	P	Cr
3	1	2	4.5

Course Objectives: This course imparts the knowledge in terms of principle/methodology used for various micromachining processes used in manufacturing industries. This course also cultivates the ability to develop and optimize the micro machining processes resulting in creation and distribution of value in engineering applications. This course also imparts the knowledge in terms of significance and selection of controlling process parameters used for the optimal performance of various engineering materials.

Course Learning Outcomes (CLOs):

The students will be able to:

1. model the material removal and tool wear rate in various micro machining processes
2. analyze the processes and evaluate the role of each process parameter during micro machining of various advanced materials.
3. design the requirements to achieve best quality of machined surface while micro machining of various industrial engineering materials.

UME836: OPERATIONS MANAGEMENT

L	T	P	Cr
3	1	0	3.5

Course Objectives: The objective of this course is to develop understanding of the strategic role of operations management in creating and enhancing a firm's competitive advantages. This will help to apply key concepts and issues of operations management in both manufacturing and service organizations by enabling the students to apply analytical skills and problem-solving tools for the analysis of the operations problems like forecast demand, material requirement planning, inventory etc.

Course Learning Outcomes (CLOs):

The student will be able to:

1. analyze the fundamental theory of operations and production management
2. analyze forecasting problems or issues faced by service and manufacturing industries
3. solve problems on materials requirement planning, aggregate production planning
4. analyze inventory management problems

UPE832: MANAGEMENT INFORMATION SYSTEMS

L	T	P	Cr
3	1	0	3.5

Course objectives: This course introduces the basic concepts of data, information, systems and management, facilitating students to understand the working of the information systems used in industry and in service sector. The course enables the students to identify inadequacies in the work systems, analyze problems, and design information systems related to business processes both in the manufacturing and service industry. The course culminates with inculcating the concepts regarding the implementation of information systems and post implementation management of information systems.

Course Learning Outcomes (CLOs):

The student will be able to:

1. explore opportunities to critically analyse existing information systems to assess scope of improvement
2. use process modeling tools for the analysis and design of business processes with regards to information systems
3. develop plans for information system development
4. design information systems structure to improve business process effectiveness and efficiency.
5. integrate business processes through the use of data information systems and improve functional integration in organizations

UPE833: DESIGN OF EXPERIMENTS AND ANALYSIS

L T P Cr

3 1 0 3.5

Course Objectives: The objective of this course is to plan, design and conduct experiments efficiently and effectively, and analyze the resulting data to obtain objective conclusions. The course also offers the knowledge and concepts for experimental design, design for experimentation and statistical based analysis of the experimental data for different industrial and manufacturing processes, process development, and manufacturing process improvement.

Course Learning Outcomes (CLOs):

The student will be able to:

1. plan experimental design leading to reduced development lead time for new processes and products, improved manufacturing process performance and products,
2. design special experimental design based on suitability and need,
3. analyze the experimental data to obtain the influence of factors and their interactions through statistical analysis,
4. decide the parametric combinations that leads to optimized solution for better process control.

UPE831: PROCESSING OF POLYMERS AND COMPOSITES

L	T	P	Cr
3	1	0	3.5

Course objective: To impart knowledge of the basic nature of different polymers and manufacturing processes associated thereof. Tailoring properties in composites as required for specific applications. To introduce attendants to the principles of the processing and concept of the deformation behaviour of plastics. To provide an outline account for all major processing routes, thermoplastics, as well as thermoset and rubbers.

Course Learning Outcomes (CLOs):

The student will be able to:

1. analyze the behavior of polymers, their properties to select suitability for engineering applications.
2. know the behavior during processing of polymers.
3. gain knowledge on the properties and industrial applications of the polymers.
4. gain practical knowledge of the structure-property relationships to improve properties of polymers and the manufacturing the products with alternative technology.
5. derive and calculate stress, strain and modulus for a given problem of unidirectional composite.