Semester VII

Project-I   3 (0+3)

Objective

To strengthen the skill of the students and for developing their confidence to take up either research or employment/ entrepreneurship as a future career.

Activity

The activities should aim at development of advanced skill for research/ employment and entrepreneurship. The activities can be planned considering the total 7 credit hours allocated in the 7th and 8th semesters, viz. Project I (0+3 credit hours in 7th semester) and Project II (0+4 credit hours in the 8th semester).

The course can be taken either for developing research skills in form of project (R and D based, field study based) or for entrepreneurship development (incubation/ experiential learning based). The student will have the option to choose the mode of this course in consultation with a faculty mentor (each student will be attached to a mentor either from the College/ University or from any organisation/ industry).

Engineering Graphics and Design   2 (0+2)

Objective

1. To acquaint the students with CAD softwares for drawing of machine components
2. To integrate the computers at various levels of planning and manufacturing

Practical

Application of computers for design; CAD- introduction, overview of CAD window; Various options on drawing screen; Practice on draw and dimension tool bar; Practice on OSNAP, line thickness and format tool bar; Practice on mirror, offset; Practice on array commands; Practice on trim, extend; Practice on trim chamfer and fillet commands; Practice on copy, move, scale and rotate commands; Drawing of 2 D- drawing using draw tool bar; Practice on creating boundary, region, hatch and gradient commands; Practice on Editing polyline- PEDIT and Explode commands; Setting of view ports for sketched drawings; Printing of selected view ports in various paper sizes; 2D- drawing of machine parts with all dimensions and allowances; Drawing of foot step bearing, knuckle joint; Sectioning of foot step bearing and stuffing box; Drawing of hexagonal, nut and bolt and other machine parts; Practice on 3-D commands- Extrusion and lift, sweep and press pull, revolving, joining; Demonstration on CNC machine and practice problems.

Suggested Readings

1. Lee, K. 1999. *Principles of CAD/CAM/CAE Systems*. Addison Wesley Longman, Inc.
2. Rao, P. N. 2002. *CAD/CAM Principles and Applications*. McGraw-Hill Education Pvt. Ltd., New Delhi.
3. Sareen, K. and Grewal, C. D. 2010. *CAD/CAM Theory and Practice*. S. Chand & Company Ltd., New Delhi.

4. Zeid, I. 2011. *Mastering CAD/CAM with Engineering*. McGraw-Hill Education Pvt. Ltd., New Delhi.

Food Quality and Safety   3 (2+1)

Objectives

To enable the student to know about the concept and aim of food quality and safety, food quality characteristics – physical, chemical and biological properties, different hazards and their prevention, different methods for measuring food quality as well as the food safety management system

Theory

Basics of food quality, safety and food analysis; Concept, objectives and need of food quality; definition, objective measurement of quality and quality and safety indices.

Quality control, quality control tools, statistical quality control; Sampling (Chemical and Microbiological): purpose, sampling techniques, sampling procedures for liquid, powdered and granular materials; Instrumental method for testing food quality, measurement of colour, flavour, consistency, viscosity, texture and their relationship with food quality and composition.

Non-destructive methods for evaluation of food quality. NIR, FTIR and chemometrics theory and application in food quality prediction. Theory and application of X-ray, CT, MRI, Ultrasound for internal quality inspection of fruits and vegetables. Sorting grading using external image analysis, internal biochemical analysis using spectroscopy.

Sensory evaluation methods, panel selection methods, Interpretation of sensory results.

Food hazards and food safety, Food borne infections, contaminants (physical, chemical, biological), adulteration, food safety strategies- Food Safety Management Systems, GAP, GHP, GMP, TQM, TQC; Hazards and HACCP, Sanitation in food industry (SSOP); Food Laws and Regulations, BIS, AGMARK, FSSAI; International Food standards (ISO-22000, CAC); Food Recall, Traceability; Bio safety and Bioterrorism; Sanitation in food industry.

Practical

Study of statistical process control in food processing industry; Study of sampling techniques, tools and protocols used in different types of from food handling, processing and marketing establishments; Study of registration process and licensing procedure under FSSAI; Examination of cereals, oilseeds and pulses from go-downs and market shops in relation to specifications provided by standardization techniques; Detection of adulteration and examination of ghee for various standards of Agmark/ FSSAI; Detection of adulteration and examination of spices for Agmark/ FSSAI standards; Detection of adulteration and examination of milk and milk products for FSSAI standards; Detection of adulteration in fruit products such as jam, jelly, marmalades as per FSSAI specification; Visit to a professional quality control laboratory; Visit to food processing laboratory in an industry and study of records and reports maintained by food processing laboratory.

Suggested Readings

1. Acharya, K. T. 2017. *Everyday Indian Processed foods*. National Book Trust.