Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2021-2022

Course Handout Part II

Date: 30-12-2021

In addition to Part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course Title	CONCURRENT ENGINEERING
Course No(s)	DE ZG663 / QM ZG663
Instructor-In-Charge	PIYUSH CHANDRA VERMA

Description : Introduction of concurrent engineering and need, concurrent engineering tools, advances in design and manufacturing engineering, design for manufacture, design for assembly, rapid prototyping, simulation, concurrent approaches to design, manufacturing and other aspects of engineering.

Course Objectives:

- Teach the students the philosophy, perspectives and methodology of concurrent engineering
- Provides basic functional knowledge of product development and concurrent engineering from a cross functional perspective, to be able to manage quality during all stages of the life-cycle
- Provide the information relevant to implementation of concurrent engineering practices.

Text Book(s):

T1	Kevin Otto and Kristin Wood, Product Design: Techniques in reverse engineering and new product development, 1/e, Pearson Education, New Delhi, 2004.

Reference Book(s) & other resources:

R1	Dieter Schmidt, Engineering Design, 4th Edition, McGraw Hill
R2	Product design for manufacture and assembly, Boothroyd,, Dewhurst, Knight , Third Edition, CRC
R3	Design for Manufacturability: How to Use Concurrent Engineering to Rapidly Develop Low-Cost, High-Quality Products for Lean Production by David M. Anderson Productivity Press (c) 2014 24x7 online
R4	Syan., C.S. & Menon, U., (Eds), Concurrent Engineering: Concepts, Implementation and Practice, Chapman & Hall, London, 1994
R5	Kusiak, A., (Ed), Concurrent Engineering: Automation, Tools, and Techniques, John Wiley and Sons, New York, 1993
R6	Huang G.Q. (Ed.), Design for X - Concurrent Engineering Imperative, Chapman and Hall, London, 1996

LEARNING OUTCOMES	
LO1	Understand the motivation behind concurrent engineering and apply the principles methods to improve quality
LO2	Analyze the quality requirements for a product and be able to implement the procedures for attainment and control of quality at different stages in the development and service life-cycle
LO3	Analyze and evaluate the design and process from various perspectives –robustness, reliability, manufacturability, assembly, disassembly, serviceability, environment-friendliness and suggest improvements
LO4	Evaluate and assess the economic aspects in concurrent design process
LO5	Work and meaningfully contribute in cross functional teams for concurrent engineering

Content Structure:

Contact Hour	List of Topic Title	Sub-Topics	Reference
1-2	Introduction to CE	● Definition, basic principles, ● Benefits and pitfalls ● Design maturity, ● Integrating Mechanisms	Lecture 1 Slides
3-4	Quality Function Deployment	● House of quality ● QFD philosophy ● Case studies	T1-Ch.7, Lecture 2 Slides
5-6	Robust design	● Introduction ● Taguchi methods ● Examples	R1-Ch.15 Lecture 3 Slides
7-8	DFM and its importance in CE	● Introduction to DFM ● Manufacturing process selection ● Value analysis ● DFM guidelines	T1-Ch.14, R1-Ch.13, Lecture 4 Slides
9-10	Poka Yoke and Manufacturability	● Introduction ● Poka Yoke ● Manufacturability Analysis	T1-Ch.14, R1-Ch.13, Lecture 5 Slides

11-12	Design For Assembly	● DFA guidelines ● Various Techniques: Boothroyd ● Various Techniques: Lucas	T1-Ch.14, R1-Ch.13, R2, Lecture 6 Slides
13-15	Rapid Prototyping	● Introduction ● Role of prototyping in CE ● Need and use of RP ● RP techniques	T1-Ch.17, Lecture 7 Slides
16-18	Design for Reliability	● Introduction to DFR ● Reliability fundamentals ● Reliability analysis during design ● General 'Design for Reliability' principles /FMEA/ Safety	R1-Ch.14, Lecture 8 Slides
19-21	Design for serviceability, maintainability, and reparability	● Design for serviceability ● Factors affecting serviceability ● Service modes ● Serviceability evaluation	Lecture 9 Slides
22-24	Design for disassembly	● Introduction ● Design for disassembly methodologies	T1-Ch.15, Lecture 10 Slides
25-27	Design for Environment	● Introduction ● Environmental issues in design ● LCA ● Eco-Design	T1-Ch.15, Lecture 11 Slides
28-30	Economic aspects in CE	● Introduction ● BEP ● NPV ● Examples	R1-Ch.16 Lecture 12 Slides
31-34	Product Development scope	● Introduction	T1-Ch. 3,4 Lecture 13 Slides

		● Mission Statement ● Customer Needs and satisfaction	
35-37	Decomposition in CE	● Introduction ● Functional Decomposition ● Function trees and Function Structures	T1-Ch. 5, Lecture 14 Slides
38-39	Product Architecture	● Introduction ● Types of architecture ● Types of modularity	T1-Ch. 9, Lecture 15 Slides
40-42	Concept Generation and Evaluation	● Introduction ● Concept generation methods ● Concept evaluation methods	T1-Ch. 10,11, Lecture 15 Slides

Evaluation Scheme:

Legend: EC = Evaluation Component; AN = After Noon Session; FN = Fore Noon Session

Evaluation Component	Type (Open book, Closed book, Online, etc.)	Weight	Duration	Day, Date, Session, Time
Quiz-I	Open Book	5%	As per the instructor	February 1 to 15, 2022
Quiz-II	Open Book	5%	As per the instructor	March 1 to 15, 2022
Report / Seminar/ Case Presentation/ Literature Review / Laboratory	Open Book	20%	As per the instructor	As per the instructor
Mid-Semester Test	Open /Closed Book	35%	90 mins	To be announced
Comprehensive Exam	Open /Closed Book	35%	120 mins	To be announced

Chamber Consultation Hour: To be announced in the class room.

Notices: All notices concerning this course shall be displayed on the CMS (the Institute's web based course management system). Besides this, students are advised to visit regularly CMS for latest updates.

Make-up Policy: Make-up shall be given only to the genuine cases with prior confirmation. Request for the make-up tests, duly signed by the students, should reach the under signed well before the scheduled test.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge

(DE ZG663 / QM ZG663)