Birla Institute of Technology & Science, Pilani
Hyderabad Campus

Academic - Undergraduate Studies Division (AUGSD)
FIRST SEMESTER 2021-2022
Course Handout Part II

Date: 07-08-2021

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 No. : **BITS F431**
Course Title : **Flexible Manufacturing System**
Instructor-in-Charge : Dr. Abhishek Sarkar
Instructors : Dr. Abhishek Sarkar (L), Ahsan Ul Haq (P)

Scope and Objective of the course:

Introduction CAD/CAM systems, overview of FMS, system hardware and general functions, material handling system, work holding systems, cutting tools and tool management, physical planning of system, software structure functions and description, cleaning and automated inspection, communications and computer networks for manufacturing, quantification of flexibility, human factors in manufacturing, FMS and CIM in action (case studies), justification of FMS, modelling for design, planning and operation of FMS.

Scope and Objective of the course:

The purpose of this course is to provide introductory as well as thorough knowledge on flexible manufacturing system. Beside detailed discussion on different components of the FMS, CAD-CAM, Robot kinematics, NC Control, emphasis will be given also to mathematical modeling, flexibility index, etc. The topics are aimed at building up a professional career in the field of flexible manufacturing system.

Text Book:

(T) Shivanand et al., ***Fexible Manufacturing System***, New Age International.

Reference Books:

(R1) P Radhakrishnan et al., CAD/CAM/CIM, New Age International.
(R2) Chang, Wysk & Wang, Computer Aided Manufacturing, Pearson Education.
(R3) Koren, Computer Control of manufacturing System, MGH.
(R4) N Viswanadham & Y Narahari, Performance Modeling of Automated Manufacturing System, PHI.
(R5) B S Nagendra Parashar, Cellular Manufacturing System, PHI.

Course Plan:

Lecturer No.	Learning Objectives	Topics to be covered	Reference Chap./Sec.
1-2	Introduction to FMS and some of its components	**Flexible Manufacturing Cell, Subsystems of FMS**	[T:1, 2], [R1:19]
3-8	Computer Aided Design	**Design of Curved Shapes, Surface Modeling, Solid Modeling, Drawing Interchange Files,**	[R1:6, 17], [R2:4,5], [R3:5]

		DDA Integrator	
9-10	Computer Aided Manufacturing	**CIM** **Cutting Tool and Tool Management**	Class note, [T:9]
11-14	NC Machines	**Operation of a CNC,** **Machining Centers,** **Part Programming**	[R1:12], [T:5], [R3:3]
15-18	Robotics	**Industrial Robotics,** **DH Parameters,** **Robot Kinematics** **Material Handling Systems (AGV),**	Class note [T:8]
19-22	Control for Manufacturing	**Control loops for NC System,** **Computerized Numerical Control,** **Adaptive Control**	[R3:6,7,8]
23-25	Physical Planning of System	**Programmable Logic Controller,**	[T-10]
26-28	System Modeling	**Mathematical modeling**	[R4:3]
29-32	Quantification of flexibility	**Cell Formation,** **Evaluation of Cellular Manufacturing,** **Machine flexibility**	[R5:1,2,4]
33-34	Cleaning and automated inspection	**Inspection and testing,** **Coordinate measuring machine,** **Robot calibration**	[R1:14], [T:7], Class note
35-36	Communications and computer networks for manufacturing	**Principles of Networking,**	[R1:15]
37-38	Software and Human factors	**Software structure functions and description,** **Modular Software design,** **Human factors in manufacturing,**	[T:11], Class note
39-40	Justification of FMS	**FMS and CIM in action,** **Case studies,** **Modelling for design, planning and operation of FMS,** **Beyond FMS**	[T:12], Class note

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Assignments/ Project	--	10%	To be announced during classes	OB*
Quiz	--	20%	2 Quizes (1 before mid-sem and 1 before comprehensive exam)	OB*

Mid-sem	90 min	30%	As announced in the Timetable	OB*
Comprehensive-Examination	120 min	40%	As announced in the Timetable	OB*

***Close Book, Open Book**

Chamber Consultation Hour: To be decided based on Timetable.
Notices: All notices will be put up on CMS only.
Make-up Policy: Make-up will be given with prior concern and genuine reasons only.
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