Gautam Buddha University, Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech.	Industrial Automation & Robotics	MEM 507	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
I	3	3-0-0	3 Hours

Unit - I

Introduction: Automation in production system; Principles and strategies of automation; Basic elements of an automated system; Advanced automation functions; Levels of automations; Introduction to automation productivity; Automation strategies; Mechanical; Electrical; Hydraulic and pneumatic automation devices and controls; Sensors; Actuators and other control system components; Converters AC to DC and vice-versa. **(10 Hours)**

Unit - II

High Volume Manufacturing Systems: Classification and type of automatic transfer machines; Automation in part handling and feeding; Analysis of automated flow lines; Design of single model; Multi-model and mixed model production lines. **(07 Hours)**

Unit - III

Assembly Automation Systems: Assembly systems; Automatic transfer; Feeding and orienting devices; Flexible assembly systems; Performance evaluation and economics of assembly systems; Economics of automation.

(07 Hours)

Unit - IV

Fundamentals of Robotics – Wrists design; End effectors; Actuators; Modular robots. Robot and its peripherals; Sensors; Machine vision; Image processing & analysis; Application of artificial intelligence; Voice communication; Robot control units; Motion controls. **(07 Hours)**

Unit - V

Robot Kinematics: Homogeneous transformations; Forward & inverse kinematics; Problems of dynamics; Differential relationships; Motion trajectories; Dynamics of a robot control of single & multiple link robot; Static force analysis; Robot programming; Different languages; Expert systems. **(07 Hours)**

Unit - VI

Robot Applications in Manufacturing: Material transfer & machine loading/unloading; Processing operations; Inspection; Automation; Robot cell design; Control; Recent developments and special applications. **(07 Hours)**

Recommended Books:

1. Automation; Production Systems and Computer Integrated Manufacturing; M.P. Groover; Pearson Education.
2. Industrial Automation : W.P. David; John Wiley and Sons.
3. Manufacturing assembly Handbook:- Bruno Lotter
4. Robotic Engineering – An Integrated Approach; Richard D Klafter; Thomas A Chmielewski & Michael Negin; Prentice Hall; 1994.
5. Robotic Technology and Flexible Automation; S. R. Deb; Tata McGraw Hill; 1994.
6. Industrial Robotics; Fu & Gonzales; Tata McGraw Hill; 1988.
7. Handbook of design; manufacturing and Automation : R.C. Dorf; John Wiley and Sons.
8. Anatomy of Automation; G. H. Amber & P. S. Amber; Prentice Hall.
9. A Robot Engineering Textbook; Mohsen Shahinpoor; Harper & Row Publishers; New York.
10. Robotics; control vision and intelligence; Fu; Lee and Gonzalez. McGraw Hill International.
11. Introduction to Robotics; John Craig; Addison Wesley Publishing.
12. Robotics for Engineers ; Yoram Koren; McGraw Hill International.
13. Industrial Robotics; Groover; Weiss; Nagel; McGraw Hill International.
14. Robot Technology Fundaments; Keramas; Thomson Vikas Publication House Company.
15. Fundamentals of Robotics Analysis and Control; Schilling; PHI.
16. Introduction to Robotics; Niku; Pearson Education; Asia.