Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title: CNC & Robotics Lab		**Course Code: 15MC64P**
Mode (L:T:P) : 0:2:4	**Credits:3**	**Core/ Elective: Core**
Type of Course: Tutorials and Practical's		**Total Contact Hours: 78**
CIE- 25 Marks		**SEE- 50 Marks**

Pre-requisites: knowledge of CNC structure, programming of CNC and Basics of Robotics

Course Objectives: To write CNC programs for simple mechanical parts involving milling, drilling & turning operations and to write program to move Robot elements

Course Outcomes: At the end of the course, students should be able to

1. Develop Programming skills to create a component as per drawing, Simulate the prepared part programme using available simulation software's.
2. Develop programming skills to move robotic elements

Course Outcome		Cognitive Level	Linked with PO	Teaching Hours
CO1	Develop Programming skills to create an component for required drawing, Simulate the prepared part programme using available simulation software's.	*A*	2,3,4	48
CO2	Develop programming skills to move robotic elements	*A*	2,3,4	30
		Total sessions		**78**

Legend: R; Remember, U: Understand A: Application

Mapping of Course Outcomes with Program Outcomes

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
CNC & Robotics Lab	-	**3**	**3**	**3**	-	-	-	-	-	-

Contents

Unit-I

Unit-II

7	Develop and execute a program for the continuous movement of all the above
8	Develop and execute a program for the movement of END GRIPPER
9	Develop and execute a program for the identification of colour
10	Develop and execute a program for the segregation of metal and non-metal parts

Contents linked with CO and PO

Sl No	Contents	CO	PO
1	Develop a part program for step turning and simulate	1	2,3,4
2	Develop a part program for taper turning and simulate	1	2,3,4
3	Develop a part program for circular interpolation and simulate	1	2,3,4
4	Develop a part program for multiple turning operation and simulate	1	2,3,4
5	Develop a part program for thread cutting, grooving and simulate	1	2,3,4
6	Develop a part program for internal drills, boring and simulate	1	2,3,4
7	Develop a part program for grooving and simulate	1	2,3,4
8	Develop a part program for drilling (canned cycle) and simulate	1	2,3,4
9	Develop a part program for mirroring with subroutines and simulate	1	2,3,4
10	Develop a part program for rectangular and circular pocketing and simulate	1	2,3,4
11	Develop and execute a program for the movement of ARM	2	2,3,4
12	Develop and execute a program for the rotation of BASE	2	2,3,4
13	Develop and execute a program for the movement of WRIST	2	2,3,4
14	Develop and execute a program for the movement of ELBOW	2	2,3,4
15	Develop and execute a program for the movement of SHOULDER	2	2,3,4
16	Develop and execute a program for PICK & PLACE movement	2	2,3,4
17	Develop and execute a program for the continuous movement of all the above	2	2,3,4
18	Develop and execute a program for the movement of END GRIPPER	2	2,3,4
19	Develop and execute a program for the identification of colour	2	2,3,4
20	Develop and execute a program for the segregation of metal and non-metal parts	2	2,3,4

Student Activity

Activity No.	Description of the Student Activity
1	Develop CNC part programming for a turning component having step turning, taper turning, thread cutting, Knurling operations
2	Develop CNC part programming for a milling component having mirroring, pocketing, contour milling operations etc.

3	Present a report on materials used for CNC tooling's(Hand written 2 0r 3 pages)
4	Present a report on inserts used in CNC cutting tools
5	Develop a CNC program for a simple component by using APT language.
6	Prepare a report on various CAM software

Note:

1. Group of max four students should above activity or any other similar activity related to the course COs and get it approved from concerned Teacher and HOD.
2. No group should have activity repeated or similar
3. Teacher should asses every student by using suitable **Rubrics** approved by HOD

Sample Rubrics

Dimension	Exemplary	Accomplished	Developing	Beginning	Roll No. of the Student				
	5/4	3	2	1	1	2	3	4	5
Organization	Information presented in logical, interesting sequence	Information in logical sequence	Difficult to follow presentation--student jumps around	Cannot understand presentation--no sequence of information	Ex: 2				
Subject Knowledge	Demonstrates full knowledge by answering all class questions with explanations and elaborations	At ease with expected answers to questions but does not elaborate	Uncomfortable with information and is able to answer only rudimentary questions	Does not have a grasp of the information. Cannot answer questions about subject	3				
Graphics	Explain and reinforce screen text and presentation	Relate to text and presentation	Occasionally uses graphics that rarely support text and presentation	Uses superfluous graphics or no graphics	4				
Oral Presentation	Maintains eye contact and pronounces all terms precisely. All audience members can hear	Maintains eye contact most of the time and pronounces most words correctly. Most audience members can hear presentation	Occasionally uses eye contact, mostly reading presentation, and incorrectly pronounces terms. Audience members have difficulty hearing	Reads with no eye contact and incorrectly pronounces terms. Speaks too quietly	5				
Total Score=(2+3+4+5)=14/4=3.5=4									

Course Assessment Pattern

Particulars			Max Marks	Evidence	Course outcomes
Direct Assessment	**CIE**	Two tests (Average of Two tests)	10	Blue books	1,2,
		Practical record	10	Practical record	1,2,
		Student Activity	05	Student Activity Sheets	1,2,
	SEE	End of the course	50	Answer scripts at BTE	1,2,
Indirect Assessment	**Student Feedback on course**	Middle of the course		Feedback forms	1
		End of the course		Feedback forms	1,2

***CIE** – Continuous Internal Evaluation ***SEE** – Semester End Examination

Note:

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

Scheme of valuation for SEE

Sl. No.	Performance	Max Marks
1	Writing any one CNC program (Turning/Milling) , execution and simulation	10+10+5
2	Developing and executing any one robot movement	10+05
3	Viva Voce	10
	TOTAL	**50**