	Reg. No.								
MANIPAL INSTITUTE OF TECHNOLOGY									

DEPARTMENT OF MECHATRONICS VII SEMESTER B.TECH. (MECHATRONICS)

END SEMESTER EXAMINATIONS, Dec, 2021

SUBJECT: ROBOT PATH PLANNING AND MOBILE ROBOTICS [MTE 4061]

Time: 09:00 AM to 01:00 PM

MANIPAL

(A constituent unit of MAHE, Manipal)

Time: 3 Hours

Date:24/12/2021

MAX. MARKS: 50

Instructions to Candidates:

✤ Answer ALL the questions.

PART A		30 Marks				
		Marks	CO	РО	LO	BL
1	 ROS was originally started at a. Stanford Artificial Intelligence Laboratory (SAIL) b. Carnegie Mellon Robotics lab c. General Robotics, Automation, Sensing and Perception (GRASP) Laboratory d. Distributed Robotics Laboratory, MIT 	1	1	1,2	1,2	1
2	Define the command used for starting ROS Master through terminal command in ubuntu? a. \$ roscore b. \$ rosmaster c. \$ rosver d. \$ roservice	1	2	1,2	1,2	1
3	Identify the typical elements in typical ROS Package structure? e. src a. xml b. catkin c. build	1	2	1,2	1,2	1
4	Mobile robots have the capability to move around in their environment and are not fixed to one physical location? f. True a. False	1	1	1,2	1,2	1
5	Identify the type of underwater robots? g. AUV a. UAV b. AGV c. UGV	1	1	1,2	1,2	1

		1				
6	Predict the usages of cameras used in navigation?	1	1	1,2	1,2	3
	a. Analytical determination					
	b. Texture Information					
	c. Both a and b					
	d. None of the above					
7	The computational problem of constructing or updating a map	1	2	1.2	1.2	1
	of an unknown environment is done by the method			,	,	
	a. SLAM Technique					
	b. Perception Technique					
	c. Path Planning Technique					
	d. Actuation					
8	How an agent ought to take actions in an environment to	1	1	1.2	1.2	1
	maximize the notion of a long-term reward	-	-	_,_	-,-	-
	a Artificial Neural Networks					
	h Deen learning					
	c. Painforcement learning					
	d Genetic algorithms					
9	The set of configurations that avoids collision with obstacles is	1	2	1 2	1 2	1
,	called as	1	4	1,4	1,4	1
	Erro Space					
	a. The space					
	0. Target space					
	c. Configuration space					
10	d. Mannold space	1	2	1.0	1.2	1
10	The robot's configuration as a point (usually electron) in a	1	2	1,2	1,2	1
	potential field that combines attraction to the goal, and					
	repuision from obstacles usually represented in?					
	a. Sampling-based algorithms					
	b. Artificial potential fields					
	c. Grid-based search					
11	d. Reward-based algorithms		-	1.0	1.0	
11	List out the computer vision challenges in real time?	I	I	1,2	1,2	I
	a. Viewpoint changes					
	b. Material Property					
	c. Both a and b					
	d. None of the above	-				
12	Intelligent suggest mission commands and planning will be	1	1	1,2	1,2	1
	done on which phase of Autonomous Execution?					
	a. Cognition Level					
	b. Perception Level					
	c. Actuation Level					
	d. Mapping and Localization Level		ļ			
13	Mechanical complexity will be more in legged robots than in	1	1	1,2	1,2	1
	wheeled robots					
	a. True					
	b. False					
14	Define the parameters required for a kinematic motion for	1	1	1,2	1,2	1
	analyzing its movement?					
	a. Speed					
	b. Mass					
	c. Force					
	d. Torque					

15	Define which is a simple mathematical representation of	1	CO1	1,2	1,2	1
	physical system?					
	a. Model or Mathematical Model					
	b. Dynamical Model					
	c. Kinematic System					
	d. Geometric System					
16	For executing the turtlesim in ROS, select the correct	1	CO2	1,2	1,2	1
	command from below:					
	a. rosrun turtlesim turtlesim_node					
	b. rosrun turtle turtle node					
	c. rosrun turtle node turtlesim					
	d. None of the above					
17	Execute turtlesim node, identify the output of command -	1	CO2	1.2	1.2	1
	rostopic type /turtle1/cmd vel ?			,	,	
	a geometry msgs/Twist					
	h msg mags/Twist					
	c cmd vel/Twist					
	d None of the above					
18	To show the frequency rate in Hz for publication which	1	CO2	12	12	1
10	command is used in topics?	I	002	1,4	1,4	T
	command is used in topics?					
	a. Tostopic fiz					
10	d. none of the above	1	000	1.0	1.0	1
19	How many parameters does cmd_vel topic contain in ROS?	1	CO2	1,2	1,2	I
	a. 3					
	b. 4					
	<mark>c. 6</mark>					
	d. 2					
20	Illustrate cross edges in Depth Fast Search algorithms. Select	1	CO3	1,2	1,2	1
	the relevant statement from the below.					
	a. True					
	b. False					
21	In breadth fast search we will not do any exploration of	1	CO3	1,2	1,2	1
	adjacent vertex. Select the relevant statement from the below.					
	a. True					
	b. <mark>False</mark>					
22	In graph-based method the collision free path is achieved by	1	CO3	1,2	1,2	1
	which of the following strategies					
	a. Vertex Connection					
	b. Equidistant from the boundaries					
	c. Sampling trees					
	d. Attractive fields					
23	The configuration space and cartesian space of two 2-R	1	CO3	1,2	1,2	1
	manipulator is same in real time for implementing path			,	,	
	planning.					
	a. True					
	b. False					
24	The distance values produced by the grassfire algorithm	1	CO4	1.2	1.2	1
	indicate the smallest number of steps needed to move from		004	-,-	_,_	-
	each node to the goal					

	b. False					
25	Graphs and tree structures in algorithms are similar. Select the	1	CO4	1,2	1,2	1
	relevant statement from the below.					
	a. True					
	b. False					
26	The significance of the generalized kinematics model of the	1	CO1	1,2	1,2	1
	wheel mobile robot is to get the relation between Vector of					
	angular velocities to the vector of input commands					
	a. True					
	b. False					
27	Analyze, for a differential drive mobile robot what will be	1	CO1	1,2	1,2	3
	values of angles between roller axis to the Xci axis					
	a. 0					
	b. 90					
	c. 210					
	d. 180			1.0	1.0	
28	The point where the total of horizontal inertia and gravity	1	COI	1,2	1,2	1
	forces equals zero while performing dynamic motion is called					
	a. ZMP (Zero Moment Point)					
	b. DBM (Dynamic Balance Margin)					
	c. SSP (Single Support Phase)					
20	u. DSP (Double Support Phase)	1	CO3	12	12	1
29	m graph-based method the conston free path is achieved by	1	005	1,2	1,2	I
	which of the following strategies					
	b Equidistant from the boundaries					
	c. Sampling trees					
	d Attractive fields					
30	In Bug Algorithm, m-line is the line connecting from which	1	CO2	1,2	1,2	1
	point to which point?	•		,	,	-
	a. Ol to Oh					
	b. Start to Ol					
	c. Qh to Goal					
	d. Start to Goal					