# University of Mumbai
# Examination 2020 under cluster 4 (PCE)

Program: BE Information Technology
Curriculum Scheme: Rev 2012
Examination: Final Year Semester VIII
Course Code: ITC8044 and Course Name: Robotics

Time: 1 hour Max. Marks: 50

| Q NO | QUESTION ( 2 marks per question) | OPTIONS | | | | Correct Answer |
|---|---|---|---|---|---|---|
| | | A | B | C | D | |
| 1 | What type of joint is used for linear motion in robot arm? | Rotational Joint | Prismatic Joint | Twisting Joint | Revolving Joints | **B** |
| 2 | Which of the following is not the application of Robotics? | Industries | Military | Medicine | Hills | **D** |
| 3 | The Kinematic parameters of robot arm is | Ɵk ,dk | ak , αk | Ɵk ,dk ,ak , αk | Ɵk , αk | **C** |
| 4 | By using inverse kinematics, we can find___________ parametres | Joint parametres | link parametres | Joint and link parametres | displacement parametres | **A** |
| 5 | What is the function of Jacobian matrix? | Relates cartesian velocity of a manipulator with its joint velocity | Cannot be used to control a manipulator | Cannot be used to check sinrularity of a manipulator | Is used to determine the joint torques and forces | **A** |

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| 6 | In Jacobians matrix of any dimension rows and columns equal to | The number of rows equals the number of degrees of freedom and the number of columns is equal to the number of joints of the manipulator | The number of rows equals the number of joints of the manipulator equals and the number of columns is equal to the number of degrees of freedom | The number of rows equals the number offorces acting on manipulator and the number of columns is equal to the number of degrees of freedom | The number of rows equals the number of joints of the manipulator and the number of columns is equal to Torques | **A** |
| 7 | The equation δx/ δt = J δq/ δt tell us that | The end effctor velocity is equal to the jacobian **J** multiplied by the joint angle velocity | The end effctor velocity | the joint angle velocity is equal to the jacobian **J** multiplied by The end effctor velocity | the joint angle velocity | **A** |
| 8 | What is mean by forward dynamics? | Calculation of torques equation | Calculation of motion equation if joint torques or end-effector forces are given | Calculation of motion equation | Calculation of joint torques or end-effector forces if motion variables are given | **B** |
| 9 | Finding joint torques given by joint angles,velocities and acceleration as input is known | Dynamics | Kinematics | Inverse kinematics | Inverse Dynamatics | **D** |
| 10 | If K denotes the kinetic enery,p denotes the potential energy, denotes langrangian, θi denotes joint variable of manipulator, then dynamic equation is given by | d/dt(δL/δ θi) - δL/δ θi= τ and L=K+P | d/dt(δL/δ θi) - δL/δ θi= τ and L=K-P | d/dt(δL/δ θi) + δL/δ θi= τ and L=K+P | d/dt(δL/δ θi) - +δL/δ θi= τ and L=K-P | **B** |

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| 11 | When planning a trajectory for the three orientation angles, the resulting global motion cannot be intuitively ___________ in advance | interpolated | visualized | applied | added | **B** |
| 12 | A complete specification of location of the robot is called its | configuration | space | workspace | obstacles | **A** |
| 13 | Which of the following statement is FALSE? Robot's trajectory function can be | a polynomial function | an exponential function | a pure linear function | a linear function with teo parabolic blends put at the ends | **C** |
| 14 | _________________provide a suitable solution class for satisfying symmetric boundary conditions in a point-to-point motion that imposes zero values on higher-order derivatives. | Lower-order polynomials | Higher-order polynomials | Quintic polynomial | Cubic polynomial | **B** |
| 15 | 1) head toward goal<br>2) if an obstacle is encountered, circumnavigate it and remember how close you get to the goal<br>3) return to that closest point (by wall-following) and continue<br>These are the steps of _____________ algorithm | BUG '0' | BUG 1 | BUG 2 | Tangent BUG | **B** |
| 16 | ______________ is the shortest distance between any point in the currently sensed environment and the goal. | dmin | dmax | dstart | dleave | **D** |
| 17 | Bug 1 and Bug 2 algorithms assume essentially ____________ sensing | local | tactile | global | distance | **B** |
| 18 | A function is ____________ if every critical point (a point where the gradient is zero) is isolated. | Navigation | Morse | Potential | Gradient Descent | **B** |

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| 19 | There is a path from some q''  RM to qgoal Qfree is called | Departability | Accessibility | Connectivity | Visibility | **A** |
| 20 | The free space F is represented by a collection of non-overlapping cells whose union is exactly F is called as | Exact cell decomposition | Approximate cell decomposition | Cell decomposition | Potential field | **A** |
| 21 | Using _________________, we can construct an adjacency graph which can be used for both navigation of a robot and coverage. | trapezoidal cells | adjacent cells | cell | morse cell | **A** |
| 22 | Attractive Potential method is based on attractive potential field due to the ____________. | obstacle | goal | start point | negative gradient | **B** |
| 23 | Behavior-based robotics works based on | Relative Velocity Approach | Incremental planning | Reactive Control Strategy | Potential Field Approach | **C** |
| 24 | N-th order polynomials have _________ maximum and minimum points. | N − 1 | N | N+1 | 2N | **A** |
| 25 | The Lagrange's equation is used to | derive equations of Torques | derive equations of differntial motion | derive equations of force | derive equations of motion | **D** |