K. K. Wagh Institute of Engineering Education and Research, Nashik
(An Autonomous Institute from A. Y. 2022-23)

SOLUTION SET C

END-Sem Examination, Winter 2025

Academic Year: 2025-2026	Semester: II
Class:FYBtech	Program:GFYE
Branch Code:ROB	Pattern:2023
Name of Course: Fundamentals Of Robotics	Course Code: 2300118H

Sr. No.	Question	Detailed Solution	Total Marks
1A	Precision vs accuracy.	Precision → repeatability; Accuracy → closeness to target. Factors: backlash, calibration, sensor error.	6
2A	Factors in gripper selection.	Weight, size, shape, material, required force, environment.	6
3A	Image processing steps.	Acquisition → Filtering → Segmentation → Feature extraction → Classification.	8
3B	Active vs passive sensors.	**Active:** require power (ultrasonic). **Passive:** use ambient energy (thermocouples).	8
3C	Integration of sensors.	Sensor → interface circuit → ADC → controller → actuator loop. Used in closed-loop control.	8
3D	Sensor fusion.	Techniques: Kalman filter, Bayesian methods, weighted average.	8

4A	Robot control system architecture.	Includes controller, memory, I/O, actuator control, feedback sensors.	8
4B	Design considerations.	Payload, speed, accuracy, working environment, safety, controller capability.	8
4C	Trajectory generation.	Includes path planning, interpolation, velocity profiles.	8
4D	Real-time control need.	Robots need deterministic response; delay affects stability & safety.	8
5A	Simulation tools.	Tools: RoboDK, ABB RobotStudio, MATLAB Simscape; used for testing programs.	8
5B	Debugging techniques.	Breakpoints, watch variables, simulation testing.	8
5C	Modular programming.	Dividing program into small modules—easy debugging & reuse.	8
5D	Coordinate systems.	Types: world, base, tool, joint coordinates. Used for accurate programming.	8