

JK LakshmiPat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY
BCA, Theory Exam-III Examination, December, 2025
Introduction to Robotics

Roll No.....

Course Code : ME1226

Time: 2 hours

Max. Marks: 30

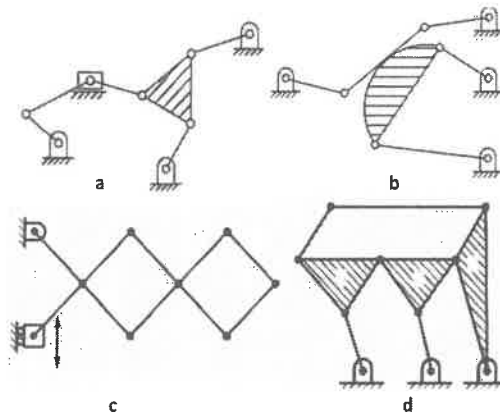
Instructions to students:

Do not write anything other than your roll number on question paper.

Assume suitable data wherever required and mention it clearly.

Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

- Q.1 Modern automated systems often rely on components that allow robots to detect objects, interpret their surroundings, and make decisions based on incoming sensory information. Describe these components and explain their role in enabling intelligent robot behavior. 04 LO1, LO2
- Q.2 Explain the concept of Degrees of Freedom (DOF) in robotic manipulators. Why is DOF an important parameter in determining a robot's workspace and capability? Determine DOF of the following mechanisms 06 LO1



- Q. 3 A robotic arm used for quality inspection requires extremely accurate and repeatable measurement of linear displacement. Which type of sensor would you recommend for this application and why? 05 LO3
- Q. 4 A parallel-finger gripper must lift a cuboidal block of mass $m=12$ kg. The gripper uses two flat fingers contacting opposite faces. The coefficient of static friction between the fingers and the block is $\mu=0.20$. The fingers are closed/actuated by a single rack-and-pinion. Find the minimum finger force f required to hold the block without slipping. Also find the required linear actuation force. The pinion radius is $r=12$ mm. 05 LO1, LO2
- Q. 5 Explain the socio economic impacts of robotization on industries and society. Discuss both the positive outcomes and the challenges that arise when robots replace or augment human labor. 05 LO3
- Q. 6 An industrial robot is being installed on an assembly line where humans frequently enter the robot's working area to load and unload parts. As the safety officer, outline the key robot safety measures that must be implemented to ensure safe human robot interaction. 05 LO4