

School of Engineering

**B.TECH Mechanical Engineering
Semester End Examination - Jun 2024**

**Duration : 180 Minutes
Max Marks : 100**

Sem VI - G3UB603B - BTME3082 - Robotics and Automation

General Instructions

Answer to the specific question asked

Draw neat, labelled diagrams wherever necessary

Approved data hand books are allowed subject to verification by the Invigilator

- 1) Provide an example of a basic robot sensor and explain its function. K1(2)
- 2) Develop a conceptual design for an automated material transport system in a manufacturing facility, considering layout, conveyance methods, and integration with existing processes. K2(4)
- 3) Analyze the role of joint integrated motion in enhancing the performance of robotic systems. K2(6)
- 4) Evaluate the potential benefits and challenges of implementing automated material transport systems in a warehouse setting. K3(9)
- 5) Evaluate the impact of implementing advanced scheduling algorithms on assembly line efficiency. K3(9)
- 6) Summarize the key considerations for integrating robotic automation into a manufacturing facility. K5(10)
- 7) Evaluate the effectiveness of obstacle avoidance techniques in robot path planning. K4(12)
- 8) A company has designed a new product line and is planning to build a new plant to manufacture this product line. The new line consists of 100 different product types, and for each product type the company wants to produce 10,000 units annually. The products average 1,000 components each, and the average number of processing steps required for each component is 10. All parts will be made in the factory. Each processing step takes an average of 1 min. Determine (a) how many products, (b) how many parts, and (c) how many production operations will be required each year, and (d) how many workers will be needed in the plant, if each worker works 8 hr per shift for 250 days/yr (2,000 hr/yr)? K5(15)
- 9) Assess the significance of automated material transport systems in modern manufacturing processes. K5(15)

10)

K6(18)

A total of 900 parts must be produced in the lathe section of the machine shop during a particular 40-hr week. The parts are of 20 different styles, and each style is produced in its own batch. Average batch quantity is 45 parts. Each batch requires a setup and the average setup time is 2.5 hr. The average machine cycle time to produce a shaft is 10 min. Availability on the lathes is 100%. How many lathes are required during the week?