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B.TECH
(SEM VII) THEORY EXAMINATION 2021-22
AUTOMATION & ROBOTICS

Time: 3 Hours**Total Marks: 100****Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

- 1. Attempt all questions in brief. 2 x 10 = 20**
- a. What is flexible Automation?
 - b. What do you understand by fluid power?
 - c. Write down the function of placement device.
 - d. Explain robot arm dynamics.
 - e. Write down the advantages of programmable part feeder.
 - f. Define robotics.
 - g. Describe silent chain.
 - h. Write some main advantages of gear drive.
 - i. Describe robot oriented programming.
 - j. What is the use of palletizing robot?

SECTION B

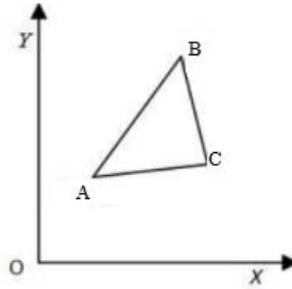
- 2. Attempt any three of the following: 10 x 3 = 30**
- a. Discuss the advantages & limitations of pneumatic power systems as compared to hydraulic systems. What is feedback control system?
 - b. What is cycle time analysis? Describe its benefits? Describe drum type transfer machines.
 - c. Explain the working of suction grippers. Compare its advantage & limitations with magnetic grippers.
 - d. Discuss in detail about types of flat belt drives with the help of sketches.
 - e. Define robot work cell? What are its different types? Describe any two with sketches.

SECTION C

- 3. Attempt any one part of the following: 10 x 1 = 10**
- (a) What are the principles of automation? Discuss about the role of robotics in industrial automation? Discuss in detail.
 - (b) Describe the components of hydraulic power system with neat sketch.
- 4. Attempt any one part of the following: 10 x 1 = 10**
- (a) Discuss about basic elements of the parts delivery system in detail.
 - (b) What are the different types of production line? Discuss each in detail.
- 5. Attempt any one part of the following: 10 x 1 = 10**
- (a) How robots are categorized on the basis of geometric work envelope. Discuss each category in brief.
 - (b) The figure below represents a triangle ABC with initial coordinates of the vertices as A(2,3), B(4,5) and C(5,3.5). The triangle is rotated in the X-Y plane about the vertex A by angle θ in clockwise direction. Take $\sin \theta = 0.6$ and $\cos \theta = 0.8$. Find out the new coordinates of the vertex B using transformation matrix method.

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6. Attempt any *one* part of the following: **10 x 1 = 10**
- (a) What are electric actuators? What are their main advantages & disadvantages? Also discuss about their types?
- (b) Explain the working of magnetic grippers. Also mention its advantages & limitations. Also compare angular grippers with parallel grippers.
7. Attempt any *one* part of the following: **10 x 1 = 10**
- (a) What is robot simulation? Write down the advantages & disadvantages of robot simulators. Also, discuss the use of robots in inspection work.
- (b) Discuss in detail about major safety considerations in using robots in painting & welding processes. Also, write the differences between online & offline programming for industrial robots.