

National Exams May 2015  
Comp-B8, Computer Integrated Manufacturing  
3 hours duration

**NOTES:**

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is an OPEN BOOK EXAM.  
Any non-communicating calculator is permitted.
3. FIVE (5) questions constitute a complete exam paper.  
The first five questions as they appear in the answer book will be marked.
4. Each question is of equal value.
5. Most questions require an answer in essay format. Clarity and organization of the answer are important.

1.
  - a) Discuss the advantages and disadvantages of numerical control for machine tools.
  - b) What are the general characteristics of production jobs in metal machining for which numerical control would be most appropriate?
  
2.
  - a) One of the axes of a robot is a telescoping arm with a total range of 0.7m. The robot's control memory has a 12-bit storage capacity for this axis of motion. Determine the robot's control resolution for this axis.
  - b) A large, hydraulically operated, Cartesian coordinate robot has one orthogonal slide with a total range of 1.2 m. One of the specifications on the robot's precision of movement is that it has a control resolution of 0.5 mm on this slide. Determine the number of bits of storage capacity which the robot's control memory must possess to provide at least this precision.
  
3.
  - a) Give examples in manufacturing in which artificial intelligence could be effective.
  - b) Give a specific example in which the variant system of CAPP is desirable, and one in which the generative system is desirable.

4.
  - a) Discuss the benefits of computer-integrated manufacturing operations.
  - b) What are the advantages of CAD systems over traditional methods of design? Are there any limitations?
  - c) Describe the purposes of process planning. How are computers used in such planning?
  
5.
  - a) Explain the features of two types of CAPP systems.
  - b) Describe the features of a routing sheet. Why is it necessary?
  - c) What is a manufacturing cell? Why was it developed?
  
6.
  - a) Describe the principle of flexible manufacturing systems. Why do they require major capital investment?
  - b) Why is a flexible manufacturing system capable of producing a wide range of lot sizes?
  - c) Explain the function of a local area network.