

National Exams December 2008

07-Mec-B4, Integrated Manufacturing Systems

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. Six (6) questions constitute a complete exam paper.
4. Each question is of equal value.
5. Some questions require an answer in essay format. Clarity and organization of the answer are important.

Question 1:

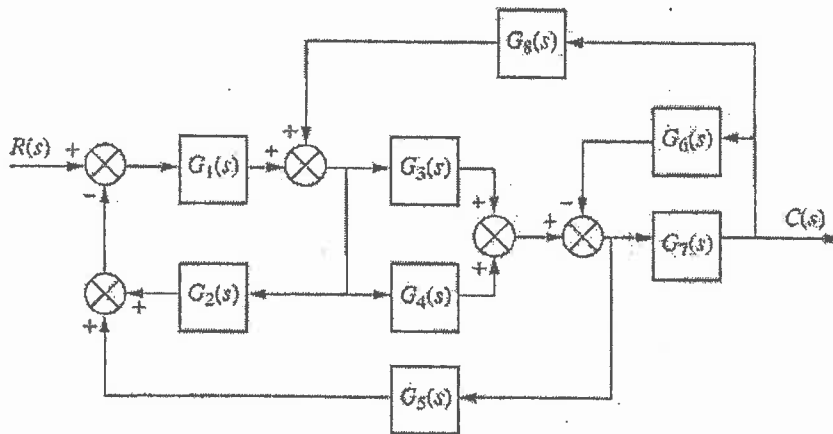
What is concurrent resource scheduling? Is this a part of a work break-down structure (WBS) or otherwise? How does it differ from precedence diagramming technique (PDM)? Explain.

Question 2:

What is the "Semi-Generative Approach" to process planning? How does it overcome the problems encountered in a fully generative process plan?

Question 3:

Determine the transfer function from of the system shown below.



Question 4:

An on-line manufacturing work cell performs a series of four quality control tests on a manufactured product. Design a PLC (Programmable Logic Controller) that will simultaneously examine the results of all four tests and decide into which of the three output containers the piece will drop. A, B, C and D are identified as four tests. Bins 1, 2, and 3 are classified as outputs. A conveyor is used to move the part between the four inspection spots. It stops for 100 sec at each spot for an inspection to be carried out before moving to the next stop. The motor for the belt is started by a normally open start switch and stopped by a normally closed switch. If the product passes either two or three tests, bin 1 will receive the part. If it passes one of the tests, Bin 2 will be open. Bin 3 accepts perfect units only.

Question 5:

What approach would you use to calculate EOQ's (Economic ordering quantity) for

- a) 50 items shipped weekly to a branch warehouse?
- b) A highly seasonal item?
- c) A part purchased as a casting, put in a raw material inventory, machined in an automatic chucking machine, held in semi-finished component inventory, finished in milling and grinding machines, kept in finished component inventory and used continuously on an assembly line?

Question 6:

Discuss some of the hazards and the preventive measures which may be taken to reduce accidents in:

- a) Loading rail cars.
- b) Handling of material in process.
- c) Handling around machine operations.