GX573

NATIONAL UNIVERSITY OF IRELAND

GALWAY

SEMESTER I

EXAMINATIONS

2000-2001

First University Examination in
Industrial Engineering and Information Systems, Undenominated Engineering, Management Engineering with Language

Introduction to Industrial Engineering

First University Examination in
Management Engineering with Language

Introduction to Management Engineering

Examiners: Dr. E.J. Wright
Professor M. E. J. O'Kelly
Dr. David O'Sullivan

Instructions: Time allowed: two hours
Attempt all questions from section A
Attempt two questions from section B
See further instructions at beginning of section A and section B

Section A

Instructions:
Attempt all questions. Use no more than 30 words to explain your answers

1. Define Engineering
2. Explain the term interchangeability
3. What is the 'Make to Order' approach to producing products
4. Define a mass producer of discrete components
5. Explain how the Design and Manufacturing functions interact.
6. Explain the term Utilisation.
7. What are Factory Overheads
8. Define 'return on investment'
9. What is 'work in progress' – should it be large or small
10. Explain some engineering aspects of eCommerce

Section B

Instructions: Attempt two questions only
All questions carry equal marks

1. The ABC Company is planning a new product line and will build a new plant to manufacture the parts for a new product line. The product line will include 50 different models. Annual production of each model is expected to be 1000 units. Each product will be assembled of 400 components. All processing of parts will be accomplished in one factory. There are an average of 6 processing steps required to produce each component, and each processing step takes 1.0 min (includes an allowance for setup time and part handling). All processing operations are performed at workstations, each of which includes a production machine and a human worker. If each workstation requires a floor space of 250 ft^2, and the factory operates one shift (2000 hr/yr), determine (a) how many production operations, (b) how much floorspace, and (c) how many workers will be required in the plant.

2. The average part produced in a certain batch manufacturing plant must be processed through an average six machines. Twenty (20) new batches of parts are launched each week. Average operation time=6 min, average setup time=5 hr, average batch size=25 parts, and average non-operation time per batch=10 hr/machine. There are 18 machines in the plant. The plant operates an average of 70 production hours per week. Scrap rate is negligible. Determine: (a) manufacturing lead time for an average part, (b) plant capacity, (c) plant utilization. (d) How would you expect the non-operation time to be affected by the plant utilization?

3. Theoretically, any given production plant has an optimum output level. Suppose a certain production plant has annual fixed costs FC=£2,000,000. Variable cost VC is functionally related to annual output Q in a manner that can be described by the function VC=£12+£0.005Q. Total annual cost is given by TC=FC+VC*Q. The unit sales price for one production unit P=£250. (a) Determine the value of Q that minimizes unit cost UC, where UC=TC/Q; and compute the annual profit earned by the plant at this quantity. (b) Determine the value of Q that maximizes the annual profit earned by the plant; and compute the annual profit earned by the plant at this quantity.