



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF ENGINEERING

DEPARTMENT OF INDUSTRIAL AND MANUFACTURING ENGINEERING

OPERATIONS MANAGEMENT

TIE 6134

Stage 1 Special Supplementary Examination Paper

March 2025



This examination paper consists of 4 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements:

Examiner's Name: Ms M Munyau

INSTRUCTIONS

1. Answer any five (5) Questions.
2. Each question carries 20 marks
3. Use of calculators is permissible

Question 1

- (a) How does scientific management impact the operations of an organization? [5]
(b) Describe the nature of relationships that exists among the three main functions of any organization (i.e. Operations, Marketing and Finance). [15]

Question 2

- (a) Describe how the concept of systems hierarchies can be used in improving systems performance in the Production Systems Model. [8]
(b) How do the following types of production systems differ:
i. Continuous Production and Mass Production. [4]
ii. Job Shop and Batch Production [4]
iii. Batch Production and Mass Production [4]

Question 3

- (a) Explain the motivation of Strategic Alliances in the Reality of Global Competition. [10]
(b) Stateless corporations is a development in resolving global competition. Explain, using any example how this would benefit the corporations. [10]

Question 4

- (a) Explain how competitive priorities drive Strategic Capacity Planning in an organization. [10]
(b) Develop a Strategic Capacity Plan of an organization of your choice. [10]

Question 5

- (a) Discuss the different policies for smoothing capacity in Aggregate Production Planning.[10]
(b) A firm producing wheelbarrows is expected to deliver 40 wheelbarrows in week 1, 60 in week 4, 60 in week 6, and 50 in week 8. Among the requirements for each wheelbarrow are two handlebars, a wheel assembly, and one tire for the wheel assembly. Orders quantities, lead times, and inventories on hand at the beginning of period 1 are shown in Table Q5.

Table Q5: Wheelbarrow parts data

Part	Order Quantity	Lead Time	Inventory on hand
Handlebars	300	2 Week	100
Wheel assemblies	200	3 Week	200
Tire	400	1 Week	50

Given that 90 wheel assemblies are also needed in period 5 for a garden tractor shipment and a shipment of 300 handlebars is already scheduled to be received at the beginning of week 2, Compute the Materials Requirements Planning to satisfy the Master Production Schedule.[10]

Question 6

- (a) Explain how you can use lean tools in improving productivity of an organisation. [10]
- (b) Develop a Value Stream Mapping for a Product of your choice. [10]

Question 7

The major jobs to be completed in constructing a house, with their immediate predecessors and estimated time durations(days) are listed in Table Q7.

Table Q7: Activity chart for house construction

Job	Description	Immediate predecessors	Duration
1	Clear site	-	2
2	Pour slab	1	1
3	Erect frame	2	2
4	Erect roof	3	3
5	Fasten wall panels	4	2
6	Plaster walls	5	2
7	Install window+door frames	3	2
8	Finish carpentry	6,7	6
9	Vanish panels	8	3
10	Install plumbing	9	1
11	Lay bathroom tiles	10	2
12	complete plumbing	11	1
13	Lay flooring	12	2
14	Install geyser	5	1
15	Lay brick work	4	3
16	Install roof tiles	3	2
17	Fit gutters	15,16	2
18	Paint fittings	17	2
19	Insulate attic	6,15	1
20	Construct driveway	15	1
21	Land scaping	20	1
22	Install electrical fittings	14	1
23	Test electrical circuit	22	1
24	Cleaning	13,18,19,23	1
25	Finishing	21,24	1

- (a) Draw the activity network diagram for the project. [10]
- (b) Calculate, the float times for each activity. [6]

(c) Identify the critical path and state the minimum duration of the project.

[4]

END OF EXAMINATION