

**MNO202B**

(464849) October/November 2009

**PRODUCTION AND OPERATIONS MANAGEMENT
(BUSINESS MANAGEMENT 202)**

Duration 2 Hours

70 Marks

 EXAMINERS
 FIRST
 SECOND

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 PROF RJ STEENKAMP

Use of a non-programmable pocket calculator is permissible

The paper consists of 9 pages plus instructions for the completion of a mark reading sheet

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Make sure that the following information appears on the cover of your answer book

- Your student number
- The module code (MNO202B)
- All the numbers of the questions you have answered

This examination paper consists of two sections. Section A contains 10 multiple-choice questions which count only one mark each. Section B consists of 3 essay-type questions of 30 marks each of which the student has to select any two of a particular PART and answer them for 60 marks out of 70. Section A and B together thus count 70 marks.

SECTION A	STUDENTS MUST ALL ANSWER THIS SECTION	10 Marks
SECTION B	SELECT ANY TWO (2) OF THE THREE (3) QUESTIONS	60 Marks
	TOTAL	70 Marks

RECOMMENDATION PLEASE CAREFULLY CONSIDER THE ABOVE ALLOCATION OF MARKS AND TOTAL TIME LIMITATION (TWO HOURS) BEFORE DECIDING ON WHICH SECTION TO ANSWER FIRST

[TURN OVER]

SECTION A

MUST BE ANSWERED BY ALL STUDENTS**ANSWER ALL 10 QUESTIONS**

- 1 Operations management is important because certain advantages may result to the business

Which **one** of the following statements **does not** embody a typical advantage associated with the operations of a business?

- 1 It can reduce the costs of producing products or rendering services more efficiently
- 2 It can increase revenue by increasing customer satisfaction through good quality and service
- 3 It can reduce the capital employed by increasing the effective capacity of the operation
- 4 It can provide the basis for future innovation
- 5 It contributes to greater environmental impact awareness

- 2 Customer/clients influence the various performance objectives a business may strive to achieve. The table below provides some customer/client needs or competitive factors which lead to certain performance objectives (eg low price → cost)

Which **two** of the following are **incorrect**?

Competitive factors (if the customers/clients value these)	Performance objectives (then the operation will need to excel at these)
a low price →	Cost
b low variability →	consistent quality
c fast delivery →	Quality
d reliable delivery →	Dependability
e ability to change timing →	flexibility (delivery)
f wide range of products →	flexibility (mix)
g ability to adapt design →	Speed

- 1 ag
- 2 cg
- 3 cb
- 4 be
- 5 df

[TURN OVER]

- 3 The DPA (Deterministic Productivity Accountability) model illustrates how productivity levels affect profitability

Which **three** of the following alternatives are **correct**?

- a A change in profit can be brought about through a change in product revenue (as influenced by product quantity and product price) and/or a change in resource value (as influenced by resource quantity and resource price)
- b A change in profit is not only affected by product and resource quantities, but also by changes in price recovery
- c An expected increase in the price of Company A's input resource will lead to an increase of its product price to counter the increase in the resource price and maintain profitability
- d An unexpected increase in the price of Company B's input resource should rather force the operation to tighten up its process so that its resource value remains constant as does its profitability
- e With reference to (c) and (d), should Company A's customer/clients choose to buy the product from Company B, the selling quantity will increase but profitability will decrease

- 1 abc
- 2 cde
- 3 abd
- 4 abe
- 5 ade

- 4 Match the type of process in manufacturing and services in column I with the appropriate example(s) in column II

COLUMN I	COLUMN II
(a) Batch process	(i) Shoe repair shop
(b) Mass process	(ii) Paint manufacturer
(c) Service shop	(iii) Beer producer
(d) Professional service	(iv) Optometrist

- 1 (a)-(iv) (b)-(iii) (c)-(ii) (d)-(i)
- 2 (a)-(i) (b)-(ii) (c)-(iii) (d)-(iv)
- 3 (a)-(iii) (b)-(ii) (c)-(iv) (d)-(i)
- 4 (a)-(ii) (b)-(iii) (c)-(i) (d)-(iv)
- 5 (a)-(iv) (b)-(ii) (c)-(iii) (d)-(i)

- 5 Which **three** of the following statements are **correct**?
- a The supply network consists of all the customer-supplier relationships that exist both on the demand and the supply side of the operation
 - b The total supply network consists exclusively of all the first-tier, second-tier and other tier suppliers
 - c Strategic decisions that need to be taken in relation to the supply network include the following the configuration of the network itself (shape and extent of vertical integration), the location of the operation, and the long-term capacity of each part of the network
 - d The whole supply network needs to be considered in design decisions because it helps the business to understand how it can compete effectively, helps to identify the particularly significant links in the network, and helps the business to focus on its long-term position within the network
 - e The supply network design includes both the product/service design and the process design
- 1 abc
 - 2 acd
 - 3 cde
 - 4 bde
 - 5 abe
- 6 The layout of an operation is concerned with the physical location of the transforming resources and also focuses on the way transformed resources flow through the whole operation

*Which **one** of the following matches of layout types to the description/advantage/disadvantage and example is **correct**?*

Basic layout type	Description/advantage/disadvantage	Example
1 Fixed-position layout	Can mean much movement of plant and staff, scheduling of space and activities can be difficult	Open-heart surgery
2 Process layout	Transformed resources entering the operation are pre-selected to move to one part of the operation which may either be a process or a product layout	Maternity unit in hospital
3 Cell layout	The needs of the transforming resources dominate the layout decision	General ward in a hospital
4 Product layout	Each transforming resource is unique and requires different actions and therefore follows a different route	Mass-immunisation programme
5 Functional layout	The flow is clear, predictable and relatively easy to control and results in low unit cost for high volume	Self-service cafeteria in the hospital

- 7 Which **three** of the following statements are **incorrect**?
- a The elements of job design include determining what the task is, where it should be performed, who is responsible for supervising the execution and when it should be completed
 - b From a historical perspective, the approaches to job design practice have become more and more human oriented
 - c The division of labour reduces the monotony of work, increases flexibility among the workforce, and promotes faster learning by specialization
 - d Method study is a scientific management approach which concentrates on determining and speeding up the time an average worker takes to carry out a specific task
 - e Ergonomic designs have the advantage that they pay specific attention to and aim to improve the interface between the worker and the physical aspects of the workplace
- 1 abc
 - 2 abd
 - 3 acd
 - 4 cde
 - 5 bcd
- 8 Which **three** of the following statements are **correct**?
- a On the one hand, the dilemma of inventory management is the high cost and other disadvantages of holding stock, and on the other, the security they provide in complex operations
 - b Inventories are a practical necessity and exist because of an imbalance between the timing of supply and demand for material resources
 - c To manage the inventory system, decisions of volume (how much to order), timing (when to order) and place (where to order) need to be taken regularly
 - d The EOQ (economic order quantity) of an item with a yearly demand of 2 000, order cost of R25 per order, purchase price of R60 per item and inventory holding cost of 20 percent of the purchase cost is approximately R91,00
 - e Seasonal items may be held in anticipation inventory and encompass stock that is produced ahead of actual demand
- 1 abc
 - 2 cde
 - 3 bde
 - 4 abe
 - 5 bcd

- 9 Which of the following statements are **incorrect**?
- a Supply chains represent the channels or strands of linked operations through which goods and services flow into the operation (on the supply side) and out of the operation (on the demand side)
 - b Materials management as an integrated concept refers to the management of the flow of materials and information through the immediate supply chain and includes both purchasing and physical distribution management
 - c Logistics, as an extension of the concept of physical distribution management, refers to the total flow of finished goods downstream from the operation, through distributions channels to the end customer
 - d Supply chain management is a much broader, more ambitious and strategically significant concept which views the entire supply chain as a system to be managed, even across company boundaries, for the benefit of the end customer
 - e Integrated concepts such as materials management, merchandising, logistics and supply chain management focus upon managing the flow of materials across the traditional functional boundaries of purchasing, production/operations and physical distribution
- 1 none
 - 2 abc
 - 3 de
 - 4 ac
 - 5 acde

- 10 Which **three** of the following statements are **incorrect**?
- a The activities of production/operations management encompass five direct responsibilities, namely to understand the operation's strategic objectives, to develop a production/operations strategy, to design, to plan and control, and to improve the production/operations system
 - b The general model of production/operations management consists of two ideas an input-transformation process-output model which has a management overlay consisting of the direct and indirect responsibilities of production/operations managers
 - c The production/operations system hierarchy consists of the internal reporting relationships between high-level, middle-level and low-level managers, supervisors and shop-floor workers
 - d An internal customer/client represents a person or group of people who over many years have reached the status of preferred trading party (ie VIP customer/client) while an internal supplier similarly has reached preferred trading status and acts as an extension of the primary business
 - e One of the advantages of buffering the production/operation system against disruptions originating from the external environmental lies in the ability of the business to significantly reduce stocks of input and output resources
- 1 abc
 - 2 bcd
 - 3 cde
 - 4 abe
 - 5 acd

Section A 10 questions x 1 mark = 10 marks

[TURN OVER]

SECTION B

**SELECT AND ANSWER ANY TWO (2) OF THE FOLLOWING THREE (3) ESSAY-TYPE QUESTIONS.
EACH QUESTION COUNTS 30 MARKS**

QUESTION 1

- 1 1 The authors of your prescribed book, Slack, N Chambers, S and Johnston, R (2007: 12) conclude that in essence **operations management is about managing processes**. Use the examples of a large Departmental store such as Woolworths and a Government department such as the SAPS (South African Police Service) to **substantiate** this statement. You need to identify and describe the **inputs**, the **transformation process(es)** and the **outputs** of the two operations. (6)
- 1 2 **Illustrate** with the aid of a diagramme, the potential internal and external effects (or benefits) of the five operations **performance objectives**. Which performance objective is internally affected by all other – **justify** your answer. (6)
- 1 3 **Outline** South Africa's **productivity performance** for the period 1996 – 2004 as illustrated by Productivity SA (former NPI) in terms of the four largest % contributing sectors to its 2004 GDP figures (ie Finance and insurance, Manufacturing, Wholesale and retail, Transport and storage). What is your **overall impression** regarding real output and productivity growth for the country over the aforementioned period and sectors. (8)
- 1 4 The operations manager of Amalgamated Beverages needs to determine the most economic batch quantity (EBQ) for various of its the well-known soft drinks. Demand is constant at 80 000 bottles per month (each month has 160 production hours) and the bottling line fill the bottles at a rate of 3 000 bottles per hour. The cost (of labour and lost production) to make a change-over from one type of a soft drink to another is estimated to be around R100 per hour. Stock holding costs are counted at 10c per bottle per month. **Calculate** the EBQ? Should the change-over time be halved – what would the effect be on the batch quantity? (5)
- 1 5 What are the **differences in the planning and control activities** for "resource-to-order", "make-to-order" and "make-to-stock", and how would their total throughput time (P) and demand time (D) differ? (5)
- [30]**

QUESTION 2

- 2 1 South Africa's **competitive position** is illustrated by the International Institute for Management Development (IMD) in their World Competitiveness Yearbook (WCY) for 2006. **Outline** the country's overall world ranking in terms of the four main competitiveness factors on which the report is based. What "positive" and "negative" aspects regarding South Africa's position can you identify? (8)
- 2 2 A reconditioned copying machine has recently been installed at your work place. The machine can operate for 7 days a week and 24 hours a day. Should the machine not operate for 59 hours a week due to planned occurrences (unavoidable) and also not for 58 hours due to unplanned stoppages (avoidable), what is the **utilisation** and **efficiency ratios** of the machine? (6)

[TURN OVER]

- 2.3 The "essence" of POM is the effective and efficient management of this function in a business. Which five (5) typical **operations "induced" failures** may occur, and how may they be prevented?

(5)

- 2.4 The table below indicates the processing times (in minutes) for six jobs in two different work centres (panel beating and painting). The work centre **sequence** is from **Y → X**.

JOB	PROCESSING TIME WORK CENTRE X	PROCESSING TIME WORK CENTRE Y
A	2	3
B	6	4
C	1	3
D	0	5
E	4	2
F	3	1

Using **Johnson's rule (algorithm)**, determine the optimal job processing sequence.

(6)

- 2.5 A partially completed **master production schedule (MPS)** for 20MVA generators is illustrated in the table below. A demand chase MPS policy is adopted throughout and the aim is to keep the available inventory to 0 (zero). Lead time is 0.

	Week					
	1	2	3	4	5	6
Demand	10	15	25	10	20	35
Available						
MPS						
On hand	30					

Required

- **Complete the MPS schedule** for weeks 1 to 6.
- Should a new buyer request an additional 40 generators in week 4, what should the **total MPS quantity** for week 4 be?

(5)

[30]

QUESTION 3

- 3.1 The Unisa library has adopted a policy whereby there should never be more than 10 students waiting at the counter where library books are issued. It takes the library assistant on average 3 minutes to issue the books to the student. The library policy further makes provision that a student should not wait longer than 6 minutes in the queue. Using **Little's Law**, **calculate how many** library assistants should be at the counter issuing books. Also **explain** the concept itself and **show** all your calculations.

(5)

- 3.2 **Distinguish** between the following three basic layout types by drawing a simple diagram and **illustrating** an appropriate practical example of each.

- product layout
- process layout
- fixed-position layout

(6)

[TURN OVER]

- 3.3 A new training company **AZZA** is to start with specialised training for first-line and middle managers. The company must decide where to locate its training facilities in South Africa. Generally, which factors should be taken into consideration when making **location decisions** and how may they broadly be classified? Which **category of factors** will probably weigh the heaviest in the case of the training company? (8)
- 3.4 Job design involves six key job-related elements. As the owner of a stone quarry in an area with midday temperatures of 35°C, **illustrate with practical examples** of how you can incorporate the six job design elements when you design the jobs at your quarry. The quarry delivers about 100 blocks per day and employs both low-skilled labourers and highly skilled stone dressers. Large machines and noisy equipment are used in the quarry. (6)
- 3.5 **Multidesign Posters** has five jobs to be processed by a particular work centre. The processing time, date received and due date for each job are given. Today is day 66 on the production/operations calendar.

Jobs in work centre

Job number	Processing Time	Date received	Due date
367	3	58	67
356	5	55	70
370	4	61	71
366	6	57	69
375	2	63	68

What will the **processing sequence** be of the five jobs if the following sequencing priority rules are followed?

- the FIFO (first-in-first-out)
- the earliest due date first
- the SOT (shortest operation time first)

(5)

[30]

Section B Any 2 questions x 30 marks = 60 marks

TOTAL NUMBER OF MARKS (SECTIONS A AND B) = [70]

PART 1 (GENERAL/ALGEMEEN) DEEL 1

STUDY UNIT e.g. PSY100-X
 STUDIE EENHEID by PSY100 X

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INITIALS AND SURNAME
 VOORLETTERS EN VAN

DATE OF EXAMINATION
 DATUM VAN EKSAMEN

EXAMINATION CENTRE (E.G. PRETORIA)
 EKSAMENSENTRUM (BY PRETORIA)

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For use by examination invigilator
 Vir gebruik deur eksamenopsiener

IMPORTANT

- USE ONLY AN HB PENCIL TO COMPLETE THIS SHEET
- MARK LIKE THIS
- CHECK THAT YOUR INITIALS AND SURNAME HAS BEEN FILLED IN CORRECTLY
- ENTER YOUR STUDENT NUMBER FROM LEFT TO RIGHT
- CHECK THAT YOUR STUDENT NUMBER HAS BEEN FILLED IN CORRECTLY
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- CHECK THAT ONLY ONE ANSWER PER QUESTION HAS BEEN MARKED
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BELANGRIK

- GEBRUIK SLEGS 'N HB POTLOOD OM HIERDIE BLAD TE VOLTOOI
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PART 2 (ANSWERS/ANTWOORDE) DEEL 2

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Specimen only

MARK READING SHEET INSTRUCTIONS

Your mark reading sheet is marked by computer and should therefore be filled in thoroughly and correctly

USE ONLY AN HB PENCIL TO COMPLETE YOUR MARK READING SHEET

PLEASE DO NOT FOLD OR DAMAGE YOUR MARK READING SHEET

Consult the illustration of a mark reading sheet on the reverse of this page and follow the instructions step by step when working on your sheet

Instruction numbers ① to ⑩ refer to spaces on your mark reading sheet which you should fill in as follows

- ① Write your paper code in these eight squares for instance

P	S	Y	1	0	0	-	X
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- ② The paper number pertains only to first-level courses consisting of two papers

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 for the second. If only one paper then leave blank

- ③ Fill in your initials and surname
- ④ Fill in the date of the examination
- ⑤ Fill in the name of the examination centre
- ⑥ WRITE the digits of your student number HORIZONTALLY (from left to right). Begin by filling in the first digit of your student number in the first square on the left, then fill in the other digits each one in a separate square
- ⑦ In each vertical column mark the digit that corresponds to the digit in your student number as follows [-]
- ⑧ WRITE your unique paper number HORIZONTALLY
NB Your unique paper number appears at the top of your examination paper and consists only of digits (e.g. 403326)
- ⑨ In each vertical column mark the digit that corresponds to the digit number in your unique paper number as follows [-]
- ⑩ Question numbers 1 to 140 indicate corresponding question numbers in your examination paper. The five spaces with digits 1 to 5 next to each question number indicate an alternative answer to each question. The spaces of which the number correspond to the answer you have chosen for each question and should be marked as follows [-]
- ◆ For official use by the invigilator. Do not fill in any information here