

**MNO202B**

(477088)

May/June 2009

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

Duration 2 Hours

70 Marks

EXAMINERS

FIRST

PROF LP KRUGER

SECOND

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 Production and operations management gets as close as one can get in the business world to “the act of creation”

*Which one of the following statements is **incorrect**? Production and operations management*

- 1 encourages other business functions to suggest ways in which it can improve its service to the rest of the business
 - 2 views a micro operation as an internal customer/client and is the most important area of employee know-how, and further arranges the resources which are devoted to the production/delivery of its goods (products) and services
 - 3 regards the design and improvement of its activities as an indirect responsibility
 - 4 focuses on the transformation model and entails information, customer/client and material processing
 - 5 views all managers as “production and operations managers” and sees them as holding the key to either satisfying or disappointing customers/clients
- 2 Which **one** of the following statements is **correct**?
- 1 “Doing things on time” in a business translates into a speed advantage
 - 2 “Doing things cheaply” in a business usually results in having to do things over and thus nullifies the quality advantage
 - 3 Being able to change things quickly in a business also brings about a dependability advantage
 - 4 “Doing things right the first time” in a business has definite flexibility advantages
 - 5 “Doing things fast” has direct benefits in terms of speed but indirectly may lead to cost advantages because the business can respond to customer/client needs quicker

- 3 Which **three** of the following statements are **correct**?
- a Productivity management may be viewed from two different levels macro-economic and micro-economic
 - b The multifactor productivity indicator is a broad measure of business effectiveness whereby multiple input factors (labour, capital, etc) are expressed in terms of actual outputs delivered
 - c The GDP (gross domestic product) per capita comprises the total value of the total output of a country divided by its total population and, in effect, reflects the relative wealth of the country
 - d South Africa is regarded as internationally unique when it comes to productivity performance because of its ethnic differences and the contrast between the advanced and backward sectors of the economy
 - e The competitive factors that are used in the World Competitiveness Yearbook (WCY) as published by the IMD (International Institute for Management Development) to rank different countries in the world in terms of competitiveness comprise government intervention, economic resilience, business efficiency and productive capacity
- 1 abc
 - 2 bcd
 - 3 cde
 - 4 abe
 - 5 acd
- 4 Which statement(s) regarding the process type in manufacturing and service operations is/(are) **correct**?
- a A project process in manufacturing usually deals with high volume and high variety
 - b For the fact that jobbing processes produce more and usually smaller items than a project process, the degree of repetition is high
 - c Batch processes and jobbing processes are basically one and the same, the only difference is that jobbing processes do not have such a high degree of variety
 - d Professional services are defined as high contact organisations where customers/clients spend some time in the service process
 - e The three broad categories of design criteria are feasibility, acceptability and dependability
- 1 d
 - 2 ab
 - 3 bcd
 - 4 bcde
 - 5 de

- 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 Which **two** of the following statements are **incorrect**?
- a The sequence of the layout procedure of an operation involves the following selecting the process type → selecting the basic layout type → doing the detailed design of the facility
 - b The process layout type involves locating the transforming resources along the sequence of the process or flow lines
 - c The fixed-position layout type is used where the transformed resources move between the transforming resources
 - d The cell layout type is appropriate to operations where regular flow is both more important and feasible, as in the case of the product layout type
 - e The choice of basic layout type becomes more important when the flow of the manufacturing or service processes is *greater in volume and less in variety*
- 1 ab
2 be
3 cd
4 bc
5 ac

- 7 Which of the following statements are **correct**?
- a Work study is applied in the investigation of all aspects of human labour and is aimed at improving efficiency and productivity
 - b Work study is a management tool based on method study, work measurement and various other specialized techniques
 - c Work study is aimed at increasing inputs with accompanying financial savings, such as a decrease in input costs
 - d Method study strives for more effective methods to obtain optimal use of material resources and human resources
 - e Method study is the part of scientific management which makes the most direct contribution to job design
- 1 abc
 - 2 ad
 - 3 ade
 - 4 abde
 - 5 bcde
- 8 Which **two** of the following statements are **incorrect**?
- a The nature of the decisions that are taken to plan and control an operation will depend largely on the extent of uncertainty in supply and demand
 - b Dependent demand planning and control can only be exercised where the demand for the item based on some other known factor is reasonably certain and predictable
 - c The demand time D (length of time that customer/clients must wait for the product) will always be greater than the throughput time P (the time it takes the operation to deliver the product to the customer/client) in "make-to-stock" operations
 - d The scheduling activity as part of the planning and control task in production/operations management must determine which tasks must be performed before (or take priority over) others
 - e The planning and control activities in production/production/operations management reconcile the supply of the operation's products or services with the demand for them by customers/clients
- 1 ab
 - 2 ae
 - 3 ac
 - 4 cd
 - 5 bc

- 9 Which two of the following statements are **incorrect**?
- a The inputs to material requirements planning (MRP) are customer/client orders and forecasted demand
 - b Demand management is defined as the management of customer/client orders and sales forecasts
 - c A master production schedule (MPS) can only be useful in the manufacturing industries
 - d Material requirement planning is based on a dependent demand system
 - e The main files kept in MRP systems that help manage inventory are the transaction, the bills of materials (BOM), ERP and the location file
- 1 ac
 - 2 ab
 - 3 cd
 - 4 ce
 - 5 be
- 10 Determine the re-order level (ROL) if safety stock for a purchased part is five units, demand for the item is ten per day, the lot size is 40 and the purchase lead time is three days
- 1 40 units
 - 2 35 units
 - 3 70 units
 - 4 90 units
 - 5 105 units

Section A 10 questions x 1 mark = 10 marks

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 **Illustrate** the nature of the production/operations processes of a motor vehicle manufacturer like BMW and a large mass transport business like South African Airways (SAA) Use the transformation process model to identify the transforming resources, the transformed resources, the type of transformation process and the outputs from the transformation process of each **Justify** the similarities and differences between the two types of production/operations processes

(8)

{TURN OVER}

- 1.2 **What is/(are)** probably the most important production/operations performance objective(s) of a smaller super market like SPAR and a mega retail store like MAKRO? **Explain** why, if any, differences in focus may be present (4)
- 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 A wholesale building-materials stockist obtains its cement from a single supplier. Demand for cement is reasonably constant throughout the year. Last year the company sold 2 000 tonnes of cement. It estimates the cost of placing an order at around R25 each time an order is placed, and charges inventory holding at 20 per cent of purchase cost. The company purchases cement at R60 per ton. **How much** cement should the company order at a time? Also **indicate** when to use EOQ and when to use EMQ (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 **What** are the implications (in terms of satisfying demand, production/operations and inventory costs, customer/client service levels, etc) for a coal mine of following
- a level capacity plan
 - a chase demand capacity plan
- (6)
- 2.3 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 X → Y

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)

[TURN OVER]

- 2.4 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)
- 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 **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)
- 3.2 A research company has decided to set up a new laboratory in South Africa to provide analysis services for mineral extraction companies. The table below shows the three locations it is considering and the criteria it is using to make the decision. If the first two factors are twice as important as the rest, **which location** do you think is most suitable for the new laboratory? Show all **your calculations**

FACTOR	PRETORIA	CAPE TOWN	DURBAN
Closeness to customer/clients	80	50	90
Closeness to universities	70	90	20
Attractiveness of city	70	90	50
Climate	60	80	60
Schools	70	80	60
Housing costs	60	20	100
Availability of sites	70	50	100

(8)

[TURN OVER]

- 3.3 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)

- 3.4 Werksman & Reyneke 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 LIFO (last-in-first-out)
- the earliest due date first
- the longest operation/longest total job time first

(5)

- 3.5 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)

[30]**Section B Any 2 questions x 30 marks = 60 marks****TOTAL NUMBER OF MARKS (SECTIONS A AND B) = [70]**