UNIVERSITY OF JOHANNESBURG

FACULTY OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY AND FOOD TECHNOLOGY
DEPARTMENT OF QUALITY AND OPERATIONS MANAGEMENT
NATIONAL DIPLOMA IN FOOD TECHNOLOGY

MODULE FTN3BFP
FOOD PRODUCTION III
CAMPUS **DFC**

NOVEMBER EXAMINATION - 2019

DATE: 12 – 11 - 2019 **TIME: 08:00 AM**

ASSESSORS **DR B.C DLAMINI**
DR A. PRADHAN

INTERNAL MODERATOR **DR AO ADEBO**
DR P. KHOLOPANE

EXTERNAL MODERATOR **PROF D. KRUGER**

DURATION: 3 HOURS **TOTAL MARKS: 120**

NUMBER OF PAGES:

INSTRUCTIONS:

THIS QUESTION PAPER CONSISTS OF **TWO** SECTIONS:
SECTION A: OPERATIONS MANAGEMENT (72 Marks: 60%)
SECTION B: FOOD LEGISLATION (48 Marks: 40%)

1. Answer ALL questions.
2. Ensure your student number appears on all material you submit.
3. Questions may be answered in any sequence but **sub-sections must be answered together.**
4. Calculators are permitted (Only one per student)

REQUIREMENTS: 2 ANSWER SCRIPTS PER STUDENT (1 PER SECTION)

SECTION A: OPERATION MANAGEMENT (ASSESSOR: DR A. PRADHAN)

QUESTION 1

1.1 Discuss four stages of a product's life cycle. (8)

1.2 Define quality. Mention any five concepts of Total Quality Management (TQM). (7)

1.3 What are the benefits of Material Requirements Planning (MRP)? (4)

1.4 A food company has an effective capacity of producing 17,500 canned food. However due to some problem, it only produced 15,000 cans last week. The production line is designed to process 150 cans per hour, and operates 7 days per week, with three 8-hours shift per day. Determine the design capacity, utilization and efficiency. If the efficiency of the line is expected to be 75%, what will be the expected production? (5)

[24 MARKS]

QUESTION 2

2.1 Discuss ways of job expansion and modifications. (8)

2.2 'Process analysis and design' tools help to identify what happens or must happen in a process. List any four tools for process analysis and design. (4)

2.3 What are the various tactics used by operations managers to match capacity to demand? (6)

2.4 A company produces plastic sachet for a coffee packaging company. The overall average weight of 4.03 gm has been found by taking many samples, and each inspection sample contained 8 sachets. The average range of the process is 0.505 gm.

(i) Determine the upper and lower control limits for averages in the process. (4)

(ii) The data for several samples is given in the following table. Do you think the process average is in statistical control? (2)

Sample	1	2	3	4	5	6
Average (gm)	4.00	4.16	3.99	3.93	4.01	3.98

[24 MARKS]

QUESTION 3

3.1 Describe graphical methods for aggregate planning. (3)

3.2 A good layout design provides competitive advantage. What considerations are required during layout design? (5)

3.3 The monthly sales of microwave ovens from January to June are provided in the table below.

Months	January	February	March	April	May	June
Sales	17	18	20	20	21	23

Forecast July sales using each of the following:

i. Naive method. (1)
ii. A 3-month moving average. (2)
iii. A 6-month weighted moving average using weight of 0.1, 0.1, 0.1, 0.2, 0.2, and 0.3. (2)

3.4 Whole Nature Foods sells a gluten-free product for which the annual demand is 6000. The cost of each unit is R 100. The inventory carrying cost is R 10 per unit per year, and the average ordering cost is R 30 per order. There are 250 working days per year.

i. What is the economic order quantity? (2)
ii. What is the optimal number of orders per year? (2)
iii. What is the optimal number of days in between any two orders? (2)
iv. What is the annual cost of ordering and holding inventory? (2)
v. What is the total annual inventory cost, including the cost of the 6,000 units? (3)

[24 MARKS]

SECTION B: LEGISLATION (ASSESSOR: DR B.C. DLAMINI)

INSTRUCTIONS: Answer all questions

QUESTION 1

a) Briefly discuss the responsibility of the Directorate "Food Control" under the Department of Health. (10)

b) **Following the Listeriosis outbreak in South Africa, the Minister of Health amendment Annexure B of Regulation No. 908 of 27 June 2003. Briefly discuss Regulation No. 908 of 2003 and indicate what the latest amendment entail. (15)**

[25 MARKS]

QUESTION 2

a) The Food Control System used in South Africa is termed "fragmented". Discuss what this means and the challenges associated with a fragmented food control system. (8)

b) Define vegetarianism and discuss the requirements of the Regulations Relating to the Labelling and Advertising of Foodstuffs (R. 146 of 2010) on making vegetarian claims. (8)

c) **Write a short summary on GlobalGAP. (7)**

[23 MARKS]

TOTAL MARKS: 120

Formulae Sheet

$$Q^* = \sqrt{\frac{2DS}{H}}$$

Q* = Optimum order quantity
D = Annual demand in units for the inventory item
S = Setup or ordering cost for each order
H = Holding or carrying cost per unit per year

Total annual cost = setup cost + holding cost.

$$TC = \frac{D}{Q}S + \frac{Q}{2}H$$

$$TC = \frac{D}{Q}S + \frac{Q}{2}H + PD$$

TC = Total cost
Q = Number of units per order
D = Annual demand in units for the inventory item
S = Setup or ordering cost for each order
H = Holding or carrying cost per unit per year
P = Price per unit

Expected no. of orders (N) = $\frac{\text{Demand}}{\text{Order quantity}} = \frac{D}{Q^*}$

Expected time between orders (T) = $\frac{\text{Number of working days per year}}{\text{Expected number of orders}}$

$$\boldsymbol{Utilization = \frac{Actual\ output}{Design\ capacity}}$$

$$\boldsymbol{Efficiency = \frac{Actual\ output}{Effective\ capacity}}$$

$$\boldsymbol{Expected\ or\ actual\ output = Effective\ capacity \times Efficiency}$$

Upper control limit: $UCL_{\bar{x}} = \bar{\bar{x}} + A_2\bar{R}$

Lower control limit: $LCL_{\bar{x}} = \bar{\bar{x}} - A_2\bar{R}$

$\bar{R} = \frac{\sum_{i=1}^{n} R_i}{n}$ = average range of the samples

A_2 = control chart factor found in Table S6.1

$\bar{\bar{x}}$ = mean of the sample means

TABLE S6.1	Factors for Computing Control Chart Limits		
SAMPLE SIZE, *n*	**MEAN FACTOR, A_2**	**UPPER RANGE, D_4**	**LOWER RANGE, D_3**
2	1.880	3.268	0
3	1.023	2.574	0
4	.729	2.282	0
5	.577	2.115	0
6	.483	2.004	0
7	.419	1.924	0.076
8	.373	1.864	0.136
9	.337	1.816	0.184
10	.308	1.777	0.223
12	.266	1.716	0.284