UNIVERSITY OF JOHANNESBURG

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

SUPPLEMENTARY EXAM

DEPARTMENT OF QUALITY AND OPERATIONS MANAGEMENT

PROGRAMME : **DIPLOMA OPERATIONS MANAGEMENT & MANAGEMENT SERVICES**

SUBJECT : **OPERATIONS MANAGEMENT TECHNIQUES 2A**

CODE : **OPT22A2/BPI22A2**

DATE : **18TH JULY 2019**

DURATION : **3 HOURS**

TIME : **(11:30 – 14:30)**

TOTAL MARKS : **100** **WEIGHT** : **50%**

EXAMINER(S) : **MISS M. SILASE**

INTERNAL MODERATOR : **DR. JF AGWA-EJON**

NUMBER OF PAGES : **3 PAGES (Including cover page)**

INSTRUCTIONS TO CANDIDATES:

- Answer ALL questions.
- This is a closed book assessment.
- Leave margins and spaces between the questions.
- Show all your calculations.
- Unless otherwise indicated, express your answers correct to two (2) decimal places.
- Where appropriate, indicate the units of your answer. (e.g. Hour, R)
- Number your answers clearly.
- Write neatly and legibly
- NOTE: Marks will be awarded for theoretical knowledge, application of the theory and use of relevant examples.
- The general University of Johannesburg policies, procedures and rules pertaining to written assessments apply to this assessment.

QUESTION 1 **[10]**

(a)

$$\left(\frac{1}{2}\right)^{x-5} = 64$$

(b)

$$3^{x+1} - 3^{x-1} - 24 = 0$$

(c)

$$3.5^{x-1} + 4.5^{x} = \frac{23}{25}$$

QUESTION 2 **[20]**

Last year, at Northern Manufacturing Company, 200 people had colds during the year. One hundred fifty-five people who did no exercising had colds, and the remainder of the people with colds were involved in a weekly exercise program. Half of the 1,000 employees were involved in some type of exercise.

(a) What is the probability that an employee will have a cold next year? (5)
(b) Given that an employee is involved in an exercise program, what is the probability that he or she will get a cold next year? (5)
(c) What is the probability that an employee who is not involved in an exercise program will get a cold next year? (5)
(d) Are exercising and getting a cold independent events? Explain your answer (5)

QUESTION 3 **[10]**

Compute the expected value, variance and standard deviation for the following normally distributed responses.

RESPONSE	RANDOM VARIABLE, *X*	PROBABILITY
Excellent	5	0.05
Good	4	0.25
Average	3	0.40
Fair	2	0.15
Poor	1	0.15

QUESTION 4 **[20]**

Neo Makola is considering the possibility of opening a small dress shop on Kingsway Road, a few blocks from the University. She has located a good mall that attracts students. Her options are to open a small shop, a medium-sized shop, or no shop at all. The market for a dress shop can be good, average, or bad. The probabilities for these three possibilities are 0.2 for a good market, 0.5 for an average market, and

0.3 for a bad market. The net profit or loss for the medium-sized and small shops for the various market conditions are given in the following table. Building no shop at all yields no loss and no gain.

ALTERNATIVE	GOOD MARKET	AVERAGE MARKET	BAD MARKET
Small shop	75,000	25,000	-40,000
Medium-size shop	100,000	35,000	-60,000
No shop	0	0	0

a. What is your recommendation using the following criteria
   - Maximax (3)
   - Maximin (3)
   - Criterion of realism (Hurwicz criterion). Use α value of 0.6 (7)

b. Develop the opportunity loss table for this situation (4). What decisions would be made using the minimax regret criterion? (3) (7)

QUESTION 5 **[20]**

Calculate the following for the problem in **question 4.**

(a)

- Expected Monetary Value (EMV) for each alternative (10)
- Minimum Expected Opportunity Loss (EOL) criterion (6)

(b) Neo has been approached by Perfect Marketing, Inc., a firm that proposes to help Neo make the decision about whether to open a shop to produce dresses. Perfect Marketing claims that its technical analysis will tell Neo with certainty whether the market is favourable for his proposed product. This information could prevent Neo from making a very expensive mistake. Perfect Marketing would charge Neo R65,000 for the information. What would you recommend to Neo? (4)

QUESTION 6 **[20]**

Solve the Hardgrave Machine Company facility location problem as shown in table below, with a Linear Programming formulation.

TO / FROM	DETROIT	DALLAS	NEW YORK	LOS ANGELES	MONTHLY SUPPLY
CINCINNATI	73 10,000	103 4,000	88 1,000	108	15,000
SALT LAKE CITY	85 –	80 6,000	100	90	6,000
PITTSBURGH	88 –	97 –	78 14,000	118	14,000
SEATTLE	113	91 2,000	118	80 9,000	11,000
MONTLY DEMAND	10,000	12,000	15,000	9,000	46,000

END OF ASSESSMENT **TOTAL [100 MARKS]**

GOOD LUCK