UNIVERSITY OF JOHANNESBURG

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

DEPARTMENT OF QUALITY OPERATIONS MANAGEMENT

PROGRAM : NATIONAL DIPLOMA: MANAGEMENT SERVICES AND OPERATIONS MANAGEMENT

MODULE : **OPERATIONS MANAGEMENT TECHNIQUES II**
CODE : **OPT22A2**
CAMPUS : **DFC**

JUNE 2018 EXAMINATION

DATE : 28 MAY 2018

DURATION : 3 HOURS

TIME : (SESSION 2) 12:30 - 15:30

WEIGHT : 50%

TOTAL MARKS : 94

EXAMINER : MR. J. MABIZA

MODERATOR : MS. E.N. NWOBODO-ANYADIEGWU

NUMBER OF PAGES : 6 PAGES

INSTRUCTIONS:

- 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
- The general University of Johannesburg policies, procedures and rules pertaining to written assessments apply to this assessment.

REQUIREMENTS : ANSWER SCRIPTS.

PART 1: READ QUESTIONS AND SOLVE THEM ACCORDINGLY

QUESTION 1

Simplify

1.1 $3^{n-4}.81^{1+n} \div 27^{-n+1}.9^{4n-1}$ (3)

1.2 $\left(\frac{a^{-2}}{2b^0}\right)^{-3} \times \sqrt[3]{a^6}$ (3)

Solve the following equation by finding x

1.3 $\frac{27^{x-1}}{9^{x+1}.\left(\frac{1}{3}\right)^{-2x}} = 81^{-1}$ (5)

1.4 A mother Onthloletse got a job as an engineer at a starting salary of R28,000. Tshwani got a job as an accountant at a starting salary of R24,000. Onthloletse will receive an annual increase of R600 and Tshwani's annual increase will be R1100. In how many years will their salaries be equal? (5)

[16]

QUESTION 2

2.1 Consider of the following matrix with the zero-sum payoffs displayed. Find through strategy maximin, minimax, pure-strategy saddle point or value of the game, and respective strategy of player A and B: (3)

		Player B				
		I	II	III	IV	V
Player A	I	-2	0	0	5	3
	II	3	2	1	2	2
	III	-4	-3	0	-2	6
	Iv	5	3	-4	2	-6

2.2 Reduce to a possible Two by Two Matrix best optimal state for Player I and player II of the following matrix. Determine its saddle point (6)

$$\begin{array}{c} \\ \text{Player I} \end{array} \begin{array}{c} \text{Player II} \\ \begin{pmatrix} 10 & 5 & 15 \\ 20 & 2 & -20 \\ 6 & 2 & 6 \\ -13 & -10 & 44 \\ -30 & 0 & 45 \\ 16 & -20 & 6 \end{pmatrix} \end{array}$$

[9]

QUESTION 3

3.1 What is the probability of drawing a card of 6 club or any diamond cards? (5)

3.2 A class contains 30 students. Ten are female (F) and U.S. citizens (U); 12 are male (M) and U.S. citizens; 6 are female and non-U.S. citizens (N); 2 are male and non-U.S. citizens. A name is randomly selected from the class roster and it is female. What is the probability that the student is a U.S. citizen; meaning the P(U|F)? (8)

[13]

QUESTION 4

Even though independent gasoline stations have been having a difficult time, Goldberg Mahlangu has been thinking about starting his own independent gasoline station. Goldberg's problem is to decide how large his station should be. The annual returns will depend on both the size of his station and a number of marketing factors related to the oil industry and demand for gasoline. After a careful analysis, Goldberg developed the following table:

SIZE OF FIRST STATION	GOOD MARKET (R)	FAIR MARKET (R)	POOR MARKET (R)
Small	500000	200000	-100000
Medium	800000	300000	-200000
Large	1000000	300000	-400000

Very large	3000000	250000	-1600000

For example, if Goldberg constructs a small station and the market is good, he will realize a profit of R500000.

(a) What is the maximax decision? (2)

(b) What is the maximin decision? (2)

(c) What is the equally likely decision? (2)

(d) What is the criterion of realism decision? Use α value of 0.8. (2)

(e) Develop an opportunity loss table. (2)

(f) What is the minimax regret decision? (2)

[12]

QUESTION 5

Solve the following transportation problem and optimize by using MODI method:

(24)

		Destination				Availability
		D1	D2	D3	D4	
Origin	O1	19	30	50	4	22
	O2	70	30	40	7	15
	O3	40	10	60	6	8
Demand		5	8	7	9	45

[24]

SUBTOTAL [74]

PART 2: MULTIPLE-CHOICE QUESTIONS

Choose the correct answer for each sub-question

1 In a pure strategy game: (2)

(a) The value of the game must be computed using probabilities.
(b) Each player will always select the same strategy, regardless of what the other person does.
(c) Each player can sometimes select same strategy, looking at the other player opt for strategy.
(d) Each player will randomly choose the strategy to be used.
(e) There will never be a saddle point.

2 The solution to a mixed strategy game is based on the assumption that, (2)

(a) Both players can be winners with no one experiencing any loss.
(b) There is sometimes a better solution than a saddle point solution.
(c) Players act irrationally.
(d) Each player wishes to maximize the long-run average payoff.

3 A saddle point exists if: (2)

(a) The largest payoff in a column is also the smallest payoff in its row.
(b) The smallest payoff in a column is also the largest payoff in its row.
(c) There are only two strategies for each player.
(d) There is a dominated strategy in the game.

4 New probabilities that have been found using Bayes' theorem are called (2)

(a) Prior probabilities.
(b) Posterior probabilities.
(c) Bayesian probabilities.
(d) Joint probabilities.

5 The If two events are mutually exclusive, then the probability of the intersection of these two events will equal the (2)

(a) 0.5
(b) 0.
(c) 1.0

6 The square root of the variance is the (2)

(a) expected value
(b) standard deviation
(c) area under the normal curve
(d) all of the above

7 If the total demand equals the total supply in a transportation problem, the problem is (2)

(a) degenerate
(b) balanced
(c) unbalanced
(d) infeasible

8 An assignment problem may be viewed as a transportation problem with (2)

(a) a cost of $1 for all shipping routes.
(b) all supplies and demands equal to 1.
(c) only demand constraints.
(d) only supply constraints.

9 If the number of filled cells in a transportation table does not equal the number of rows plus the number of columns minus 1, then the problem is said to be (2)

(a) unbalanced.
(b) degenerate.
(c) optimal.
(d) maximization problem.

10 If a solution to a transportation problem is degenerate, then (2)

(a) a dummy row or column must be added.
(b) it will be impossible to evaluate all empty cells without removing the degeneracy.
(c) there will be more than one optimal solution.
(d) the problem has no feasible solution.

SUBTOTAL [20]

TOTAL [94]