



UNIVERSITY
OF
JOHANNESBURG

**FACULTY OF ENGINEERING
(SUPPLEMENTARY EXAM FIRST SEMESTER)**

PROGRAMME : **BACHELOR OF TECHNOLOGY**
SUBJECT : **OPERATIONS MANAGEMENT 4A**
CODE : **BPJ44A4**
DATE :
DURATION : **180 Minutes**
TIME : **08H00-11H30**
TOTAL MARKS : **100**

EXAMINER : **Dr. NDALA YVES MULONGO, PhD**
INTERNAL MODERATOR : **PROF PULE KHOLOPANE**
EXTERNAL MODERATOR : **PROF KEM RAMDASS**
NUMBER OF PAGES : **2 PAGES**

INSTRUCTIONS TO CANDIDATES:

- ✓ Answer ALL questions.
- ✓ **THIS IS AN OPENED BOOK TEST.**
- ✓ 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.

OPERATIONS MANAGEMENT 4A (BPJ44A4)

QUESTION 1 [40]

Activities	Optimistic Time	Most Likely Time	Pessimistic Time	Predecessor
A	13	13	15	-
B	40	46	60	-
C	11	15	30	-
D	3	3	6	-
E	6	8	10	A
F	4	5	8	B, C, D, E
G	3	3	3	F
H	25	30	50	G
I	3	5	10	H
J	3	3	10	I
K	20	30	45	I
L	3	3	3	I
M	3	3	3	J, K, L
N	10	13	20	M
O	10	14	28	M
P	2	2	2	N, O
Q	5	5	5	P

- a. Determine the critical path **[15]**
- b. Calculate the number of standard deviation (Z). Knowing that the desired project completion time is 325 days **[15]**
- c. What deadline is consistent with a 0.8888 probability of on-time completion? **[10]**

QUESTION 2 [20]

Cyril is a University of Johannesburg student, currently conducting her Masters degree in the Department of Quality and Operations Management. After her graduation. Cyril purchased a Fiat Panda for taxi purpose, which has a first cost of ZAR 250,000, and a maximum useful life of 7 years, as well as a market (salvage) value described by the relation $S = 120,000 - 20,000x$, where x is the number of years since it was purchased. The salvage value cannot go below zero. The AOC series is estimated using $AOC = 70,000 + 10,000x$. The interest rate is 10% per year. Determine the economic service life of the Fiat Panda.

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QUESTION 3 [20]

A university of Johannesburg lab is a research contractor to ESKOM for in-space fuel cell systems that are hydrogen and methanol-based. During lab research, three equal-service machines need to be evaluated economically. Perform the present worth analysis with the costs shown below. The MARR is 10% per year.

	Electric-Powered	Gas-Powered	Solar-Powered
First cost, ZAR	5 750 500	4 830 650	6 970 150
Annual M&O cost, ZAR per year	840 050	780 050	160 000
Salvage value, ZAR	3 850 000	2 850 750	4 900 570
Lifespan, years	5	6	6

QUESTION 4 [20]

Cyril an University of Johannesburg's Masters student purchased his first Fiat Panda in 2014 for ZAR 150 000. As of 2019, the Fiat Panda is 5-year and is not able to meet today's Cyril's demands. The car can be upgraded now for ZAR85,000 or resale for ZAR 65,000. Cyril's present owned Fiat Panda has an annual operating cost of ZAR 95,000 per year and a ZAR 50,000 salvage worth within 5 years. If upgraded, the currently Cyril Fiat Panda will be kept for only 5 more years, then replaced with a new a brand new Fiat Panda. The replacement Fiat Panda, which will serve Cyril's needs now and for at least 8 years, has an estimated cost of ZAR 235,000. Its salvage worth will be ZAR 70,000 for years 1 through 4; R60,000 after 5 years; and R40,000 thereafter. It has an estimated operating cost of R65,000 per year. Cyril wants to perform an economic analysis at 10% per year using a 5-year planning horizon. Should Cyril replace the currently owned Fiat Panda now, or do it 5 years from now?

Good Luck [100]