THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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MAIN EXAMINATION

JANUARY – APRIL 2019 TRIMESTER

FACULTY OF COMMERCE

DEPARTMENT OF ACCOUNTING AND FINANCE

EVENING PROGRAMME

CMS 321: ANALYTICAL DECISION MAKING

Date: APRIL 2019	**Duration: 2 Hours**
INSTRUCTIONS: Answer Question ONE and ANY OTHER TWO Questions	

Q1. a) A manufacturer has two products P_1 and P_2 both of which are produced in two steps by machines M_1 and M_2. The process times per hundred for the products on the machines are:

	M_1	M_2	Contribution (per 100 units)
P_1	4	5	10
P_2	5	2	5
Available hours	100	80	

The manufacturer is in a market upswing and can sell as much as he produces of both the products.
Formulate the mathematical model and determine optimal product mix, using simplex method. **(20 marks)**

b) Solve the following LPP using graphical method.

Maximize: $Z = 12X_1 + 16X_2$

Subject to constraints:

$10X_1 + 20X_2 \leq 120$

$8X_1 + 8X_2 \leq 80$

Non negativity constraints:

$X_1, X_2 \geq 0$ **(10 marks)**

Q2. UKZN Maintenance Department employs five joiners. Each man has different abilities

and skills and takes different amounts of time to do each job. At present, there are five jobs to be allocated. The time taken for each job by each person is given below:

		Time per job (hours)				
		Job 1	Job 2	Job 3	Job 4	Job 5
EMPLOYEE	M1	25	16	15	14	13
	M2	25	17	18	23	15
	M3	30	15	20	19	14
	M4	27	20	22	25	12
	M5	29	19	17	32	10

The jobs have to be assigned one job to one man. How this should be done in order to minimize the total man-time needed to finish all of the jobs? Use the Hungarian method to solve the problem. **(20 marks)**

Q3. Find the initial basic feasible solution of the following transportation problem by Northwest corner cell method and then optimize the solution using U-V method.

Destination

	1	2	3	4	supply
Source1	3	1	7	4	250
2	2	6	5	9	350
3	8	3	3	2	400
Demand	200	300	350	150	

(20 marks)

Q4. XYZ Ltd has listed the following activities in respect of a project.

Activity	Preceding Activity	Duration (days)
A	-	2
B	A	1
C	A	5
D	A	8
E	B	6
F	C	1
G	C	2
H	C and D	3
I	E and F	7
J	G and H	4
K	I and J	5

Required:

a) Draw a network diagram and determine the critical path. **(10 marks)**

b) Find out the total float, free float and independent float of the non-critical activities. **(10 marks)**

FORMULAE

$t_e = (a + 4m + b)/6.$

Expected duration = $\frac{\text{Optimistic time + (4)Most expected time + Pessimistic time}}{6}$

the variance $(\sigma^2) = \frac{(\text{Pessimistic time - Optimistic time})^2}{6}$

$\sigma^2 = (b - a/6)\ 2$

$Z = \frac{\text{Due date – Expected date of completion}}{\sqrt{\text{Project variance}}}$

END