JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BUSINESS AND ECONOMICS

UNIVERSITY EXAMINATIONS FOR DEGREE OF BACHELOR IN LOGISTICS & SUPPLY CHAIN MANAGEMENT

3RD YEAR 2nd SEMESTER 2020/2021 ACADEMIC YEAR

MAIN CAMPUS

COURSE CODE: BBM 3321 **COURSE TITLE: OPERATIONS RESEARCH**

DATE:1/12/20 **TIME: 9-12 NOON**

DURATION: 3 H0URS

INSTRUCTIONS:

   I.   This paper contains **Five** questions

  II.   Answer question **ONE** and any other **TWO** questions

 III.   Question one is **COMPULSORY**

 IV.   **Candidates are advised to write on the text editor provided, or to write on a foolscap, scan and upload alongside the question.**

 V.   **Candidates must ensure that they submit their work by clicking 'FINISH AND SUBMIT ATTEMPT' button at the end.**

Question One (**30marks**)

a) A person deposits a sum of Ksh150, 000 at an interest rate of 18% compounded annually for 5 years. Find the maturity value after 5 years [**3marks**]

b) A firm produces three products; A, B and C, which passes through three processes: X, Y and Z. The profit contribution of products A, B, and C, are Ksh5, Ksh9, and Ksh12 respectively. The table below shows the amount of time, in hours, that each unit of a product spends in each process.

Table 1

Products	Processes		
	X	Y	Z
A	2	3	5
B	3	1	2
C	4	2	1

The maximum time available in processes: X, Y, and Z, is 150, 200, and 180 hours, respectively.

Formulate a linear programme and obtain the optimal solution for the problem [**5marks**]

c) (i) Explain the concept 'Simulation' [**1marks**]

(ii) Explain four steps in solving a Monte – Carlo processes [**8marks**]

d). Explain any Five performance measures in queuing model [**5marks**]

e) Explain the following as used in game theory

    i) Game dominance [**1marks**]
    ii) Zero sum game [**1marks**]
    iii) Pure strategy [**1marks**]
    iv) Game value [**1marks**]

f) Explain FOUR assumptions of priority rules [4**marks**]

Question Two (**20marks**)

    a) Explain Five assumptions of a single-server model in the queuing theory [**10marks**]

    b) A typist receives on average 20 letters per day for typing. The typist works for 8 hours a day and takes on average 22minutes to type a letter.

Required:

        i) The typist utilisation rate

        ii) Expected number of letters waiting to be typed [**10marks**]

Question Three (**20marks**)

a) A plant has four operators to be assigned to four machines. The time (minutes) required by each worker to produce a product on each machine is shown in the following table. Determine the optimal assignment and compute total minimum time [**10marks**]

Table 2

	Machine			
	A	B	C	D
1	10	12	9	11
2	5	10	7	8
3	12	14	13	11
4	8	15	11	9

b). Table 3 below contains information concerning six jobs that are awaiting processing at a work centre

Table 3

JOBS	PROCESSING TIME (DAYS)	DUE DATE (DAYS)
A	2	7
B	8	16
C	4	4
D	10	17
E	5	15
F	12	18

Based on the Due Date (DD) rule, determine

i) The sequence of jobs

ii) Total Flow time

iii) Tardiness

iv) Make span

v) Average number of jobs [**10marks**]

Question Four (**20marks**)

a) A hand-drill manufacturer that produces two models, regular and portable, must assemble at least 100 drills for each day's delivery. The regular drill requires 2 hours of preparation and costs sh10 and the portable requires 5 hours of preparation and costs sh15. The dealer's objective is to minimise his total

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cost of preparation given that he has 400 preparation hours available each day and at least 40 portables must be assembled each day

Required

i) Formulate this problem as a linear programme

ii) Solve the problem graphically   [**10marks**]

b) Solve the following transportation problem using VAM method and confirm optimality of the solution obtained from VAM   [**10marks**]

Table 4

From	TO			Supply
	A	B	C	
1	5	8	6	60
2	10	9	12	105
3	7	6	8	70
Total	70	110	55	235

Question Five (**20marks**)

a) Highlight **FIVE** procedures used in graphical solution method of linear programming   [**10marks**]

b) B. N Limited is considering the purchase of a new machine. Two alternative machines, A and B, have been identified. Each machine requires an initial cash outlay of Ksh.500, 000. The estimated life of each machine is 5years.

Year	Cash flows	
	A	B
1	50,000	80,000
2	60,000	100,000
3	70,000	70,000
4	80,000	60,000
5	40,000	50,000

Using Net Present Value Approach (NPV), select the better machine to be bought   [**10marks**]