



SCHOOL OF COMPUTING AND ENGINEERING SCIENCES (SCES)
FACULTY OF INFORMATION TECHNOLOGY (FIT)
BACHELOR OF SCIENCE IN INFORMATICS AND COMPUTER SCIENCE (ICS)
CAT 2
ICS 3106: OPERATION RESEARCH

DATE: Friday, 8th July, 2022

TIME: 1 Hour

Question one (15 Marks)

- (i) Explain clearly the differences between CPM and PERT as used in project networks. (2 marks)
- (ii) A small project consisting of eight activities has the following characteristics:

Time – Estimates (in weeks)

<i>Activity</i>	<i>Preceding activity</i>	<i>Most optimistic time (a)</i>	<i>Most likely time (m)</i>	<i>Most Pessimistic time (b)</i>
A	None	2	4	12
B	None	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11
F	B,C	9	9	9
G	D	3	3.5	7
H	E,F,G	5	5	5

- (a) Draw the PERT network for the project. (3 marks)
- (b) Prepare the activity schedule for the project. (2 marks)
- (c) Determine the critical path. (3 marks)
- (d) If a 30- week deadline is imposed, what is the probability that the project will be finished within the time limit? (3 marks)
- (e) If the project manager wants to be 99% sure that the project is completed on the schedule date, how many weeks before that date should he start the project work? (2 marks)

Question two (15 Marks)

- (i) A cement company has three factories manufacturing cement which is then transported to four distribution centers. The quantity of monthly production of each factory, the demand of each distribution centre and the associated transportation cost per quintal are given as follows

Factories	Distribution centers				Monthly production (in quintals)
	W	X	Y	Z	
A	10	8	5	4	7,000
B	7	9	15	8	8,000
C	6	10	14	8	10,000
Monthly Demand (in quintals)	6,000	6,000	8,000	5,000	

- (a) Find the initial basic feasible solution by Vogel's Approximation method. (5 marks)
- (b) Obtain the optimal solution of the problem and hence calculate minimum total transportation cost. (5 marks)
- (ii) A company is producing a single product and selling it through five agencies situated in different cities. All of a sudden, there is a demand for the product in five more cities that do not have any agency of the company. The company is faced with the problem of deciding on how to assign the existing agencies to dispatch the product to the additional cities in such a way that the travelling distance is minimised. The distances (in km) between the surplus and deficit cities are given in the following distance matrix

Deficit City						
Surplus city		I	II	III	IV	V
	A	160	130	175	190	200
	B	135	120	130	160	175
	C	140	110	155	170	185
	D	50	50	80	80	110
	E	55	35	70	80	105

Determine the optimum assignment schedule. (5 marks)

****END****