COMSATS University Islamabad, Abbottabad.
Department of Mathematics

Mid-Term Examination Fall-2025

Class: BSE-7B
Subject: Operations Research
Time Allowed: 90 Minutes
Name: KASHIF Khan

Date: October 31, 2025
Instructor: Dr. Sheikh Irfan Ullah Khan
Marks: 25
Registration: FA22-BSE-061

Q No 1: The demand for an item in a company is 18000 units/year, and the company can produce at the rate of 3000 per month. The cost of one set up is Rs. 500 and the holding cost of 1 unit per month is 15 paisas. Determine:

(a) The optimum manufacturing quantity.

(b) The maximum inventory.

(c) The time between orders.

(d) The number of orders/years.

(e) The time of manufacture.

(f) The optimum annual cost if the cost of the item per unit is Rs. 2.

Q No 2: A project has the following characteristics:

Activity	Optimistic time	Pessimistic time	Most likely time	
1-2	1	5	1.5	2
2-3	1	3	2	2
2-4	1	5	3	3
3-5	3	5	4	4
4-5	2	4	3	3
4-6	3	7	5	5
5-7	4	6	5	5
6-7	6	8	7	7
7-8	2	6	4	4
7-9	5	8	6	6
8-10	1	3	2	2
9-10	3	7	5	5

Construct a network. Find the critical path and variance for each event. Find the project duration at 95% probability.

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Q No 3: Draw network from the following list of activities.

Job Name	Immediate predecessor	Job Name	Immediate predecessor
a	-	l	k
b	a	m	k
c	b	n	k
d	c	o	d
e	b	p	o
f	e	q	b
g	e	r	n
h	c	s	l, m
i	c, f	t	s
j	g, h, i	u	p, q
k	j	v	u

Q No 4: Mr. Majid Khan has Rs. 70, 000 to investment in several alternatives. The alternative investments are national certificates with an 8.5% return, Defense Savings Certificates with a 10% return, NIT with a 6.5% return, and Khas deposit with a return of 13%. Each alternative has the same time until maturity. In addition, each investment alternative has a different perceived risk thus creating a desire to diversify. **Majid Khan wants to know how much to invest in each alternative to maximize the return.**

The following guidelines have been established for diversifying the investments and lessening the risk:

1. No more than 20% of the total investment should be in Khas deposit.
2. The amount invested in Defense Savings Certificates should not exceed the amount invested in the other three alternatives.
3. At least 30% of the investment should be in NIT and Defense Savings Certificates.
4. The ratio of the amount invested in national certificates to the amount invested in NIT should not exceed one to three.

Q No 5: Find all the basic solutions of the following system of equations. Is the solution feasible?

$$2x_1 + x_2 + 4x_3 = 11$$
$$3x_1 + x_2 + 5x_3 = 14$$

Good Luck

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