THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF MANAGEMENT STUDIES
BACHELOR OF MANAGEMENT STUDIES (HONOURS) DEGREE PROGRAMME
LEVEL 3
ACADEMIC YEAR: 2023/24
OSU3407 - QUANTITATIVE TECHNIQUES FOR MANAGEMENT

Deadline for Submission: - 14/07/2024 (On or Before 8.00 pm)

Instructions:

- *Answers should be clearly hand-written.*
- *Upload the answer script to the assignment drop box in OULMS platform of the 'OSU3407– Quantitative Techniques of Management' course in the form of a pdf document. You may use one of the following methods to prepare your document:*
  Method I - Take snapshots of hand-written pages, copy them to a word file and convert the document to pdf form using 'save as' function and selecting 'pdf' file format.
  Method II - Scan the hand-written pages and convert it to pdf form
- *Save the document with your registration number in the document title.*
- *Note that the maximum upload size of the document to the dropbox is 2MB.*
- *Plagiarism and copying are considered an examination offence.*
- *Late Assignments will not be accepted.*
- *Refer to the 'Policy for Take-Home Assignments' for the formatting guidelines of the assignment. It is available in LMS.*
- *If you have no access to the LMS of this course, you can submit your assignment to osu3407.2024@gmail.com. Please note that no email submissions should be made if you have submitted your assignment to the dropbox. Assignments submitted to any other email, other than the above mentioned email will not be accepted for evaluation.*

Question 1

Simplify and solve the following:

1. (4+3X) / (-3+5X) = 2 (4 marks)
2. $-2 + (4 + 3^3 / 4) \times (-5)^2$ (4 marks)
3. If x = 2, y = -5 and z = -7, then find the value of the following expression. (4 marks)

$$\frac{4x^3-10}{(3y^2+5)-\frac{4x^3(z^2-8)}{(y^3+5)}}$$

4. $110 + 4[25x - 2\{-8x + 3(11 - 5x)\}]$ (4 marks)
5. $\frac{2x-1}{x^2+4x+4} \div \frac{4x^2-2x}{x+2} * \frac{3x}{2}$ (4 marks)

6. $\frac{2}{x^2+x} + \frac{2x-1}{x^2-x+1} = \frac{2x^2-1}{x^2+x}$ (5 marks)

(Total 25 marks)

Question 2

1. A person divides his total investment amount of Rs. 440,000/- among three investment opportunities so that for the second investment, he will invest twice as much as the first investment, and for the third investment he will invest Rs. 60,000/- less than the second investment. Find the amounts invested for 3 investments separately. (6 marks)
2. If the total profit per month of a company is Rs 200,000/- and its revenue per month can be obtained by adding Rs. 20,000/- to the twice the cost per month, find the revenue and cost per month. (6 marks)
3. A sum of Rs 80,000/- is to be used to give ten cash prizes to students at a school for their overall academic performances. If each prize is Rs 1,500/- less than its preceding prize, find the value of each prize. Use your knowledge on Progressions to answer this question. (6 marks)
4. Each year, a person earns a salary that is 2 percent higher than his previous year's salary. In the first 5 years at this job, this person earned a total of Rs. 1,550,000/-. What was the salary in the 1st year at this job? Calculate 5th year salary. (Hint: Use the knowledge of progressions)

(7 marks)

(Total 25 marks)

Question 3

1. A principal of Rs 20,000/- is placed in a savings account at 3% per annum compounded annually. How much is in the account after five years? (3 marks)
2. A person deposits Rs 250,000/- in a savings account for which an annual interest rate of 11% is paid. If the interest is calculated monthly, what is the total amount in his account after 5 years? (3 marks)
3. Find the effective rate of interest which is equal to the nominal rate of interest of 12.5% on which the compound interest rate is calculated semi-annually? (3 marks)
4. If a person invests Rs. 15,000/- at the beginning of a year and continues this practice for 6 years and if the rate of interest payable on his investments is 13.5% find the total amount, he will receive at the end of 6 years. (3 marks)

5. If an investor receives an annual income of Rs. 20,000/- at the beginning of the year from a certain investment for 4 years. If the rate of interest he gets is 7.5% and the cost of investment is Rs. 50,000/-, can this be considered a profitable investment? (3 marks)
6. A company is evaluating 2 investments (Investment A and Investment B). The profit forecast of each investment for 5 years are given in the table below:

Investment	Investment amount	Investment income				
		1st year	2nd year	3rd year	4th year	5th year
A	(400,000)	120,000	90,000	Nil	65,000	57,500
B	(500,000)	130,000	65,000	Nil	45,000	42,500

Identify the **most profitable investment** by calculating the net present values. Use the discount rate of 16%. (10 marks)

(Total 25 marks)

Question 4

For a company that sells a kids educational toy, the revenue and costs are given by the following functions:

Revenue $(R) = 150Q - 4Q^2$

Variable cost (VC) = Q - 10

Fixed Cost $(FC) = 30$

Q is the number of units sold

Production function is $Z = 2K^3 + 4L^4 + 5L^2K^4$, where K is capital and L is labor.

a) Write a mathematical function for total cost if the number of products that can be sold is X. (02 marks)
b) Find the marginal revenue of the company. (02 marks)
c) Find the marginal cost of the company. (02 marks)
d) Find the profit maximizing output of the company. (03 marks)
e) Find the marginal effectiveness of capital. (02 marks)

f) Find the marginal effectiveness of labor. (02 marks)

g) Find the breakeven level of production. (03 marks)

h) If the fixed cost is given as 50 when the marginal cost is 3x-30, find the total cost function. (04 marks)

i) Plot the revenue function and cost function in the same graph and mark the breakeven points (05 marks)

(Total 25 marks)

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