UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(ONLINE)
SEMESTER I
SESSION 2020/2021

COURSE NAME	:	FUNDAMENTALS OF MATHEMATICS FOR COMPUTER SCIENCE
COURSE CODE	:	BIC 10003
PROGRAMME CODE	:	BIM / BIP / BIS /BIW
EXAMINATION DATE	:	JANUARY / FEBRUARY 2021
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1 Calculate the derivative and its application.

(a) $2x^3 - 4x^2 + x - 33$

(3 marks)

(b) $\sqrt[3]{x}$ $\frac{1}{\sqrt{x}}$

(3 marks)

(c) $(2x^2 + 1)^2$

(3 marks)

(d) $\frac{e^x}{x+1}$

(5 marks)

(e) $(x^5 + e^x)^{55}$

(3 marks)

(f) $(x^2 + 1)^7(3x - 7)^4$

(4 marks)

(g) A spherical bubble is being filled with air. The volume is changing at a rate of 4 cubic cm per minute. How is the radius changing with respect to time when the radius is equal to 2 cm? [given Volume of bubble, $V = \frac{4}{3}\pi r^3$]

(4 marks)

Q2 Calculate the integration and its application.

(a) $\int(6x + 4x^3 - 9x^2)dx$

(3 marks)

(b) $\int \frac{\ln(x)}{x^2} dx$

(4 marks)

(c) $\int(5x + 2)^7 dx$

(4 marks)

(d) $\int_0^2 (-3x + 4)e^{-3x^2+8x} dx$

(4 marks)

(e) $\int_0^1 \frac{x^2-8x+3}{x+2} dx$

(5 marks)

(f) Find the area below $f(x) = -x^2 + 4x+3$ and above $g(x) = -x^3 + 7x^2 - 10x + 5$ over the interval $1 \leq x \leq 2$.

(5 marks)

Q3 Solve these statistics problems for ungrouped and grouped data.

(a) Find the mean, variance and standard deviation for the following set of data representing several landscape trees in UTHM (heights in feet):

3, 21, 98, 203, 17, 9

Related formula:

mean, avg $= \sum_i \frac{x}{n}$ where x is an element and n is the number of data.

variance, var $= \frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}$

standard deviation, sd $= \sqrt{var}$

(10 marks)

(b) Based on *Table 1*, the frequency distribution of orders received each day during the past 50 days at the bakery shops, calculate the mean, variance and standard deviation.

Related formula:

mean, $\bar{x} = \frac{\sum fx}{n}$, where x is element, f is frequency and n is number of elements.

variance, $s^2 = \frac{\sum fx^2 - \frac{(\sum fx)^2}{n}}{n-1}$

standard deviation, $s = \sqrt{s^2}$

Table 1 Number of Orders

Number of orders	f
10 - 12	4
13 – 15	12
16 – 18	20
19 - 21	14
	n = 50

(15 marks)

Q4 Solve these probability problems.

(a) There are 10 chocolates in a bag: 3 are red, 2 are blue and 5 are green. The contents of the bag are shaken before Syafiah randomly chooses one chocolate from the bag. What is the probability that she *does not* pick a green chocolate?

(2 marks)

(b) A special die is made in the shape of 10 faces called decagon, and its faces are numbered with the numbers 1 to 10. When the die is thrown there is an equal chance of any face landing uppermost. If the die is thrown once, what is the probability that the face that lands uppermost has a number that is a factor of 10?

(2 marks)

(c) A fair coin is tossed three times. What is the probability of obtaining two Heads and one Tail?

(2 marks)

(d) Your boss fairly assigns randomly everyone an extra 2 hours work on weekend evenings between 4.00 and midnight. What are the chances you get Saturday between 10 12?

(4 marks)

(e) The body temperature scan for Covid-19, and an alarm is supposed to be triggered when the body temperature > 37.5°C. Suppose that 5% of customers have body temperature > 37.5°C.

i. Draw a tree probability diagram based on these scenarios.

- If a customer has body temperature > 37.5°C, there is a 98% chance that it triggers the alarm.
- If a body temperature is ≤ 37.5°C, there is an 8% chance that it triggers the alarm.

(8 marks)

ii. By using the result of tree probability diagram in question Q4(e) i,

1. No alarm triggered.

(2 marks)

2. A randomly chosen customer triggers the alarm, what is the probability that his body temperature is > 37.5°C?

(5 marks)

- END OF QUESTION -