UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2009/2010

SUBJECT	:	MATHEMATICS I
CODE	:	DSM 1913
COURSE	:	1DEE / DET / DDM / DDT / DFA/ DFT
DATE	:	APRIL / MAY 2010
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER ALL QUESTIONS IN **PART A** AND **THREE (3)** QUESTIONS IN **PART B**

THIS EXAMINATION PAPER CONSISTS OF 7 PAGES

PART A

Q1 (a) Ganesan is recording the length of earthworms for his Group 4 project. His data are shown in **Table Q1(a)**.

Table Q1(a): Length of earthworm

Length of earthworm(cm)	Frequency
4.5 – 8.4	3
8.5 – 12.4	12
12.5 – 16.4	26
16.5 – 20.4	45
20.5 – 24.4	11
24.5 – 28.4	2

From the data in **Table Q1(a)**, determine the

(i) mean.
(ii) median.
(iii) mode.
(iv) standard deviation.

(13 marks)

(b) The best times (in seconds) for the 200m at an athletics event are shown below.

20.51	22.45	23.63	21.91	24.03	23.80	21.98
19.98	20.97	24.19	22.54	22.98	21.84	22.96
20.46	23.86	21.76	23.01	22.74	23.51	20.02

Determine the

(i) range.
(ii) mean.
(iii) standard deviation.
(iv) variance.

(7 marks)

Q2 (a) A bag contains 3 red balls, 4 black balls and 3 yellow balls. What is the probability of drawing either a red ball or a black ball from the bag?

(4 marks)

(b) A man visits his local supermarket twice in a week. The probability that he pays by credit card is 0.4 and the probability that he pays with cash is 0.6. Find the probability that

(i) he pays cash on both visits.

(ii) he pays cash on the first visit and by credit card on the second visit.

(6 marks)

(c) The results of a traffic survey on cars are shown in **Table Q2(c).**

Table Q2(c): Traffic survey on cars

	Less than 3 years old	Between 3 and 6 years old	More than 6 years old
Grey	30	45	20
Black	40	37	17
White	50	30	31

(i) What is the probability that a car is less than 3 years old?

(ii) Given that a car is grey, what is the probability that it is less than 3 years old?

(iii) Given that a car is more than 6 years old, what is the probability that it is white?

(10 marks)

PART B

Q3 (a) Solve the given equations.

(i) $5^{2x+1} + 4 = 21 \times 5^x$.

(ii) $\log_3 x + \log_x 9 = 3$.

(12 marks)

(b) Decompose $\dfrac{x+4}{(x+1)(x-2)^2}$ into a partial fraction.

(8 marks)

Q4 (a) Given $f(x) = x^3 - 3x^2 + 1$. If $f(x) = 0$, by using secant method, find its root, x, between the interval of [2, 3]. Iterate until $|f(x_i)| < \varepsilon = 0.001$.

(10 marks)

(b) (i) Expand $(1+3x)^{10}$ until the term of x^3. Hence evaluate $(1.003)^{10}$ correct to five places of decimals.

(ii) Using the binomial theorem, find $\sqrt{9.18}$ correct to five places of decimals.

(10 marks)

Q5 (a) Solve $\cos\theta = \sin\left(\theta + \dfrac{\pi}{3}\right)$ for $0 \le \theta \le 2\pi$.

(5 marks)

(b) Given that α and β are acute angle with $\sin\alpha = \dfrac{7}{25}$ and $\cos\beta = \dfrac{5}{13}$, find $\tan(\alpha + \beta)$ without using calculator.

(5 marks)

(c) Given $f(x) = 3x + 1$, $g(x) = \sqrt{x+3}$ and $h(x) = \dfrac{2}{x-3}$. Find

(i) $(g \circ h)(x)$.

(ii) $(h \circ f \circ h)(x)$.

(5 marks)

(d) Prove that $p(x) = \sqrt[3]{3x-2}$ and $q(x) = \dfrac{1}{3}x^3 + \dfrac{2}{3}$ are inverses of one another.

(5 marks)

Q6 (a) The contents of 40 bags of nuts were weighed and the results in grams are shown in the **Table Q6(a)**. Group the data by using class intervals, starts with $26.5 \leq x < 27.5$.

Table Q6(a): Weight of Bags

28.4	29.2	28.7	29.0	27.1	28.6	30.8	29.9
30.3	30.7	27.6	28.8	29.0	28.1	27.7	30.1
29.4	29.9	31.4	28.9	30.9	29.1	27.8	29.3
28.5	27.9	30.0	29.1	31.2	30.8	29.2	31.1
29.0	29.8	30.9	29.2	29.4	28.7	29.7	30.2

(i) Construct a histogram for the ungroup data.
(ii) Determine the mean, mode and median of the data.

(14 marks)

(b) A card is picked at random from a pack of 20 cards numbered 1, 2, 3, ….., 20. Given that the card shows an even number, find the probability that it is a multiple of 4.

(6 marks)

FINAL EXAMINATION

SEMESTER / SESSION : SEM 2 / 2009/2010 COURSE: 1 DEE /DET/DFT/DFA/DDM/DDT
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Formulae

Arithmetic Sequences

(i) $u_n = a + (n-1)d$

(ii) $d = u_n - u_{n-1}$

(iii) $S_n = \frac{n}{2}(a + u_n)$

(iv) $S_n = \frac{n}{2}[2a + (n-1)d]$

Geometric Sequences

(i) $u_n = ar^{n-1}$

(ii) $r = \frac{u_n}{u_{n-1}}$

(iii) $S_n = \frac{a(1-r^n)}{1-r}$ **if** $r < 1$

(iv) $S_n = \frac{a(r^n - 1)}{r-1}$ **if** $r > 1$

(v) $S_\infty = \frac{a}{1-r}$

Binomial Theorem

For any positive integer n

$$(x+y)^n = \binom{n}{0}(x)^n(y)^0 + \binom{n}{1}(x)^{n-1}(y)^1 + \ldots + \binom{n}{n}(x)^0(y)^n$$

where :

$$\binom{n}{k} = \frac{n!}{k!(n-k)!}$$

Binomial Theorem

$$(1+b)^n = 1 + nb + \frac{n(n-1)!}{2!}b^2 + \frac{n(n-1)(n-2)!}{3!}b^3 + \ldots.$$

$|b| < 1$, n any real number

Statistics

Ungroup Data :

$$\bar{x} = \frac{\sum x}{n}$$

$$\bar{x} = \frac{\sum fx}{\sum f} \text{ (with frequency table)}$$

$$m = \begin{cases} X_{\frac{n+1}{2}}, & n \quad odd \\ \dfrac{X_{\frac{n}{2}} + X_{\frac{n+1}{2}}}{2}, & n \quad even \end{cases}$$

$$\sigma = \sqrt{\frac{\sum x^2}{n} - \left(\bar{x}\right)^2}$$

$$\sigma^2 = \frac{\sum x^2}{n} - \left(\bar{x}\right)^2$$

Statistics

Group Data :

$$\bar{x} = \frac{\sum fx}{\sum f}$$

$$m = L_m + \left(\frac{\frac{\sum f}{2} - F}{f_m}\right)c$$

$$m_o = L_m + \left(\frac{d_1}{d_1 + d_2}\right)c$$

$$\sigma = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\bar{x}\right)^2}$$

$$\sigma^2 = \frac{\sum fx^2}{\sum f} - \left(\bar{x}\right)^2$$