UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Sekolah Pendidikan Profesional dan Pendidikan Berterusan (UTMSPACE)

FINAL EXAMINATION / *PEPERIKSAAN AKHIR*
SEMESTER 2 – SESSION 2015 / 2016
PROGRAM KERJASAMA

COURSE CODE *KOD KURSUS*	:	DDPS 1113
COURSE NAME *NAMA KURSUS*	:	ALGEBRA / *ALJABAR*
YEAR / PROGRAMME *TAHUN / PROGRAM*	:	1 / DDPC / DDPZ
DURATION *TEMPOH*	:	2 HOURS 30 MINUTES / 2 *JAM 30 MINIT*
DATE *TARIKH*	:	APRIL 2016

INSTRUCTION/*ARAHAN* :

1. ANSWER **ALL SIX (6)** QUESTIONS.
   *(JAWAB SEMUA **ENAM (6)** SOALAN)*

2. A BOOKLET CONTAINING A LIST OF FORMULA AND TABLES OF DISTRIBUTION IS PROVIDED FOR REFERENCE.
   (BUKU KECIL MENGANDUNGI SENARAI RUMUS DAN JADUAL TABURAN DISEDIAKAN SEBAGAI RUJUKAN)

(You are required to write your name and your lecturer's name on your answer script)
(Pelajar dikehendaki tuliskan nama dan nama pensyarah pada skrip jawapan)

NAME / *NAMA*	:	.....
I.C NO. / *NO. K/PENGENALAN*	:	.....
YEAR / COURSE *TAHUN / KURSUS*	:	.....
COLLEGE NAME *NAMA KOLEJ*	:	.....
LECTURER'S NAME *NAMA PENSYARAH*	:	.....

This examination paper consists of ...8... pages including the cover
Kertas soalan ini mengandungi .....8..... muka surat termasuk kulit hadapan

1. (a) **A, B and C are three sets which satisfy the following conditions:**

A, B dan C adalah tiga set yang memenuhi syarat-syarat berikut:

$$n(A \cap B \cap C) = 4,$$
$$n(A \cap B) = n(A \cap C) = 10,$$
$$B \cap C \cap A' = \varnothing,$$
$$n(C) = 30, \quad \textbf{and / } \textit{dan}$$
$$n(A) = n(B)$$

If $n(A \cup B \cup C) = 50$, **then find** $n(A)$.

Jika $n(A \cup B \cup C) = 50$, *maka dapatkan* $n(A)$.

(b) (i) **Find addition of the following numbers in base 10.**

Dapatkan hasiltambah nombor-nombor berikut dalam asas 10.

$$111001_2 + 2FAB_{16}$$

(ii) **Convert the octal number** 14732_8 **into a binary equivalent**

Tukarkan nombor oktal 14732_8 *kepada penduaan yang sama nilai.*

[10 marks]

2. (a) **State whether the following statement is negation, conjunction, disjunction, conditional or biconditional statements.**

Nyatakan samada pernyataan berikut merupakan satu penafian, konjungsi, disjungsi, pernyataan bersyarat atau dwisyarat.

(i) **Ahmad and Manjit are business partners.**

Ahmad dan Manjit adalah rakan perniagaan.

(ii) **If it is not late, then I will go to the Post Office.**

Jika masih belum lewat, maka saya akan pergi ke Pejabat Pos.

(iii) $A \cap B = A$, **if and only if** $A = B$.

$A \cap B = A$, *jika dan hanya jika* $A = B$.

[3 marks]

(b) **Construct the truth table for each of the following to prove that**

Bina jadual kebenaran bagi setiap yang berikut untuk membuktikan bahawa

(i) $\sim(p \vee q) \Rightarrow (\sim p \wedge \sim q)$ **is a tautology.**

$\sim(p \vee q) \Rightarrow (\sim p \wedge \sim q)$ *adalah satu tutologi.*

(ii) $(p \wedge q) \vee (p \wedge \sim q) \equiv p$ **is logically equivalent.**

$(p \wedge q) \vee (p \wedge \sim q) \equiv p$ *adalah setara secara logic.*

[6 marks]

3. (a) **Simplify/** *Permudahkan* $\dfrac{\sqrt{2}+3\sqrt{5}}{1+\sqrt{5}}$ **[3 marks]**

(b) **Find the value of x.**

Dapatkan nilai bagi x.

$9^{x+1} = 27$ **[3 marks]**

(c) **Solve the equation**

Selesaikan persamaan $\log_5 2x - \log_5 (x-3) = 1$.

[4 marks]

4. (a) **The first term of an arithmetic progression is 5 and the last term is 95. If the sum of all terms is 2550, then calculate the number of terms and the common difference.**

Sebutan pertama bagi suatu janjang aritmetik adalah 5 *dan sebutan terakhir adalah* 95. *Jika hasiltambah semua sebutan adalah* 2550, *maka kirakan bilangan sebutan dan beza sepunya.*

[4 marks]

(b) **In a geometric progression, the first term is a = 6. Find the common ratio r and the number of terms n, given that the fifth term is 96 and the sum of the first n terms is 12282.**

Sebutan pertama suatu janjang geometri adalah a = 6. *Dapatkan nisbah sepunya r dan bilangan sebutan n, jika diberi sebutan kelima adalah* 96 *dan hasiltambah n sebutan pertama adalah* 12282.

[3 marks]

...nomial expansion of $(1-2x)^{15}$.

...pan bagi kembangan binomial $(1-2x)^{15}$.

[3 marks]

... and $g(x)=\sqrt{x+1}$.

... dan $g(x)=\sqrt{x+1}$.

...nd range of $f(x)$ **and** $g(x)$.

...ain dan julat bagi $f(x)$ *dan* $g(x)$.

...osite function $f(g(x))$ **and** $g(f(x))$.

...si gubahan $f(g(x))$ *dan* $g(f(x))$.

...in $D_{f \circ g}$ **of the composite function.**

...ain $D_{f \circ g}$ *bagi fungsi gubahan tersebut.*

[5 marks]

...ion $f(x)=x^3+2x^2-5x-6$. **Determine all the factors for** $f(x)$.

$...)=x^3+2x^2-5x-6$. *Tentukan semua faktor bagi* $f(x)$.

[4 marks]

(c) Find ...

Dapatkan sebutan kel...

5. (a) Let $f(x)=3x^2+2x-1$

Biar $f(x)=3x^2+2x-1$

(i) Find domain a...

Dapatkan dom...

(ii) Find the comp...

Dapatkan fungs...

(iii) Find the doma...

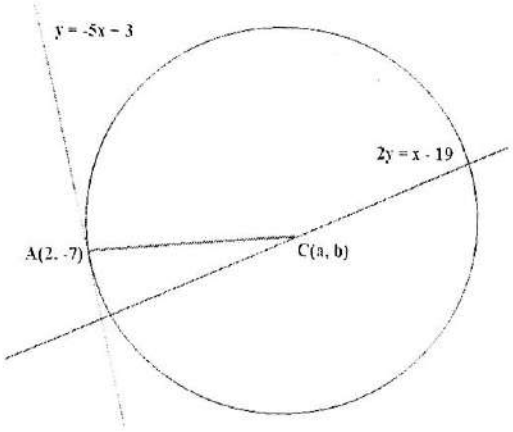
Dapatkan dom...

(b) Given the cubic funct...

Diberi fungsi kubik $f(x...$

6. **A tangent line $5x+y-3=0$ touches a circle at point $A(2,-7)$, and the centre of the circle $C(a,b)$ lies on the straight line $x-2y-19=0$ as shown in Diagram 1.**

Suatu garis tangen $5x+y-3=0$ menyentuh satu bulatan pada titik $A(2,-7)$, dan pusat bulatan $C(a,b)$ terletak di atas garislurus $x-2y-19=0$ seperti ditunjukkan pada Rajah 1.



(a) **Find the slope of the normal line, and then determine the equation for AC.**

Dapatkan kecerunan garis normal, dan kemudian tentukan persamaan bagi AC.

(b) **Use the line $x-2y-19=0$ and the normal line equations of AC to determine the values of a and b.**

Gunakan persamaan garis $x-2y-19=0$ dan persamaan garis normal AC, untuk menentukan nilai bagi a dan b.

(c) **Find the radius of the circle by calculating the distance of AC.**

Dapatkan radius bagi bulatan dengan mengirakan jarak bagi AC.

(d) **Hence, find the equation of the circle.**

Seterusnya, dapatkan persamaan bagi bulatan tersebut.

[12 marks]

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

APPENDIX

Indices	Logarithm
$a^m.a^n = a^{m+n}$ $\frac{a^m}{a^n} = a^{m-n}$	$\log_a(mn) = \log_a m + \log_a n$ $\log_a\left(\frac{m}{n}\right) = \log_a m - \log_a n$ $\log_a m^p = p\log_a m$

Arithmetic Progressions	Geometric Progressions
$a_n = a + (n-1)d$ $S_n = \frac{n}{2}\{2a + (n-1)d\}$	$a_n = ar^{n-1}$ $S_n = \frac{a(r^n - 1)}{r^n - 1}$

Binomial Theorem

The Binomial Theorem for any Positive Integer n.

$$(a+x)^n = a^n + {}^nC_1a^{n-1}x + {}^nC_2a^{n-2}x^2 + {}^nC_3a^{n-3}x^3 + {}^nC_4a^{n-4}x^4 + \ldots + x^n$$

$$= \sum_{r=0}^{n} {}^nC_r a^{n-r}x^r$$

The Binomial Theorem when n is not Positive Integer $(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \frac{n(n-1)(n-2)}{3!}x^3 + \ldots$

The expansion is valid for $-1 < x < 1$.

Coordinate Geometry Formulae

Distance between $A(x_1, y_1)$ and $B(x_2, y_2)$

$$|AB| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Mid-point of $A(x_1, y_1)$ and $B(x_2, y_2)$

$$M(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Slope or gradient of straight line from $A(x_1, y_1)$ to $B(x_2, y_2)$ is: $m = \left(\frac{y_2 - y_1}{x_2 - x_1} \right)$

$P(x, y)$ which divides the line AB with ratio m:n

$$P(x, y) = \left(\frac{nx_1 + mx_2}{n+m}, \frac{ny_1 + my_2}{n+m} \right)$$

Slope of parallel lines are equal

$$m_1 = m_2$$

Slope of perpendicular lines are negative reciprocal to the other $m_1 = -\frac{1}{m_2}$

Slope Intercept form of straight line equation

$$y = mx + c$$

Point slope form of straight line equation at (h, k)

$$y - k = m(x - h)$$

Perpendicular distance from P(h, k) to a straight line $ax + by + c = 0$

$$D = \frac{ah + bk - c}{\sqrt{a^2 + b^2}}$$

Area of a Triangle with vertices $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$

$$ABC = \frac{1}{2} \begin{vmatrix} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{vmatrix}$$

$$= \frac{1}{2} \left| (x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3) \right|$$

Area of a Quadrilateral with vertices $P(x_1, y_1)$, $Q(x_2, y_2)$, $R(x_3, y_3)$ and $S(x_4, y_4)$

$$PQRS = \frac{1}{2} \begin{vmatrix} x_1 & x_2 & x_3 & x_4 & x_1 \\ y_1 & y_2 & y_3 & y_4 & y_1 \end{vmatrix}$$

$$= \frac{1}{2} \left| (x_1 y_2 + x_2 y_3 + x_3 y_4 + x_4 y_1) - (x_2 y_1 + x_3 y_2 + x_4 y_3 + x_1 y_4) \right|$$

Formula for Circles

Standard Equation of Circle

$x^2 + y^2 = r^2$

Center at $(0, 0)$ and radius r

$(x - h)^2 + (y - k)^2 = r^2$

Center at (h, k) and radius r

General Equation of Circle

$x^2 + y^2 + 2gx + 2fy + c = 0 = r^2$

Center at $(-g, -f)$

and radius $r = \sqrt{g^2 + f^2 - c}$

Equation of tangent line that touches the circle at $P(x_1, y_1)$ with center of circle at $C(h, k)$

$$y - y_1 = -\left(\frac{x_1 - h}{y_1 - k} \right)(x - x_1)$$