UTM
Sekolah Pendidikan Profesional dan Pendidikan Berterusan (UTMSPACE)

UNIVERSITI TEKNOLOGI MALAYSIA

FINAL EXAMINATION / *PEPERIKSAAN AKHIR*
SEMESTER 1 – SESSION 2016 / 2017
PROGRAM KERJASAMA

COURSE CODE : DDPS 1113
KOD KURSUS

COURSE NAME : ALGEBRA /
NAMA KURSUS *ALJABAR*

YEAR / PROGRAMME : 1 / DDPC /DDPZ
TAHUN / PROGRAM

DURATION : 2 HOURS 30 MINUTES / *2 JAM 30 MINIT*
TEMPOH

DATE : OCTOBER 2016
TARIKH

INSTRUCTION/*ARAHAN* :

1. Answer **ALL SIX (6) question.**
   Jawab **SEMUA ENAM (6)** *soalan* .

2. Candidates are reguired to follow all instructions given out by the examination invigilators.
   Calon dikehendaki mematuhi semua arahan daripada penyelia peperiksaan.

3. A list of formula is provided at the last page for reference .
   senarai rumus disediakan pada muka surat terahir 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 ...9... pages including the cover
Kertas soalan ini mengandungi ......9....... muka surat termasuk kulit hadapan

1. (a) **Consider the Venn diagram in Diagram 1**

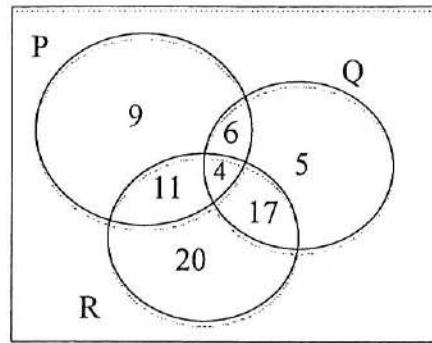   *Pertimbangkan gambarajah Venn dalam Rajah 1*

   $$n(\xi) = 75$$

   Diagram 1 / *Rajah 1*

   Calculate:

   Kirakan:

   (i) $n(P \cup Q \cup R)'$ (ii) $n(P' \cap R')$

   (iii) $n(Q' \cap R')$ (iv) $n((P \cup R) \cap Q)$

   [4 M]

   (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.

      [4 M]

   (c) **Find the value of x :**

      Dapatkan nilai x :

      $$16^{x-1} + 1 = 1000001_{16}.$$

      [4 M]

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) Anna and Marie are sisters.

  Anna dan Marie adalah adik-beradik.

  (ii) Ah Siew will buy some noodles if his mother give him some money.

  Ah Siew akan membeli sedikit mee jika ibunya memberikan sedikit wang.

  (iii) If $x = 3$, then $2x^2 = 18$.

  Jika $x = 3$, maka $2x^2 = 18$.

[3 M]

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

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

[6 M]

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

(b) Find the value of x.

  Dapatkan nilai bagi x.

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

(c) Solve the equation

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

[4 M]

4. (a) Find the series for integers between 50 and 100 that is divisible by 3. Then calculate the sum of all term in the series.

Dapatkan siri bagi integer antara 50 dan 100 yang boleh dibahagi tepat dengan 3. Kemudian kirakan hasiltambah semua sebutan dalam siri tersebut

[3 M]

(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 M]

(c) Determine the binomial expansion of $\sqrt[3]{1+2x}$ up to and including the term x^3.

Dapatkan kembangan bagi $\sqrt[3]{1+2x}$ sehingga sebutan yang mengandung x^3.

[3 M]

5. (a) Let $f(x) = 2x^3 + 1$ and $g(x) = \dfrac{1}{x+5}$.

Biar $f(x) = 2x^3 + 1$ dan $g(x) = \dfrac{1}{x+5}$

(i) Find domain and range of $f(x)$ and $g(x)$.

Dapatkan domain dan julat bagi $f(x)$ dan $g(x)$.

(ii) Find the inverse of $f(x)$ and $g(x)$.

Dapatkan songsangan bagi $f(x)$ and $g(x)$.

(iii) Find domain $D_{f^{-1}}$ and $D_{g^{-1}}$ of the function.

Dapatkan domain $D_{f^{-1}}$ dan $D_{g^{-1}}$ bagi fungsi tersebut.

[5 M]

(b) Given the function $f(x) = \dfrac{3x}{(x-1)(x+2)}$ for $x \neq 1$ and $x \neq -2$. Write the function $f(x)$ in the form $f(x) = \dfrac{A}{(x-1)} + \dfrac{B}{(x+2)}$.

Diberi fungsi $f(x) = \dfrac{3x}{(x-1)(x+2)}$ bagi $x \neq 1$ and $x \neq -2$. Tuliskan fungsi $f(x)$ dalam bentuk $f(x) = \dfrac{A}{(x-1)} + \dfrac{B}{(x+2)}$.

[4 M]

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

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

Gunakan persamaan garis tangen 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 jejari bagi bulatan dengan mengirakan jarak bagi AC.

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

Seterusnya, dapatkan persamaan bagi bulatan tersebut.

[10 M]

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

APPENDIX

Indices	**Logarithm**
$a^m . a^n = a^{m+n}$ $\dfrac{a^m}{a^n} = a^{m-n}$	$\log_a(mn) = \log_a m + \log_a n$ $\log_a\left(\dfrac{m}{n}\right) = \log_a m = \log_a n$ $\log_a m^p = p \log_a m$
Arithmetic Progressions	**Geometric Progressions**
$a_n = a + (n-1)d$ $S_n = \dfrac{n}{2}\{2a + (n-1)d\}$	$a_n = ar^{n-1}$ $S_n = \dfrac{a(r^n - 1)}{r-1}, \quad r > 1$ $S_n = \dfrac{a(1-r^n)}{1-r}, \quad r < 1$

Binomial Theorem

The Binomial Theorem for any Positive Integer n.

$$(a+x)^n = a^n + {}^nC_1 a^{n-1}x + {}^nC_2 a^{n-2}x^2 + {}^nC_3 a^{n-3}x^3 + {}^nC_4 a^{n-4}x^4 + \ldots + x^n$$

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

The Binomial Theorem when n is not Positive

Integer $(1+x)^n = 1 + nx + \dfrac{n(n-1)}{2!}x^2 + \dfrac{n(n-1)(n-2)}{3!}x^3 + \ldots$

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 $B(x_2, y_2)$ $M(x, y) = \left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2} \right)$
Slope or gradient of straight line from $A(x_1, y_1)$ to $B(x_2, y_2)$ is: $\quad m = \left(\dfrac{y_2 - y_1}{x_2 - x_1} \right)$	$P(x, y)$ which divides the line AB with ratio m:n $P(x, y) = \left(\dfrac{nx_1 + mx_2}{n + m}, \dfrac{ny_1 + my_2}{n + m} \right)$
Slope of parallel lines are equal $m_1 = m_2$	Slope of perpendicular lines are negative reciprocal to the other $m_1 = -\dfrac{1}{m_2}$
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 $ax + by + c = 0$ $D = \dfrac{ah + bk - c}{}$	