QS015
Mathematics
Semester I
Session 2012/2013
1 hour

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Matematik
Semester I
Sesi 2012/2013
1 jam

BAHAGIAN MATRIKULASI
KEMENTERIAN PELAJARAN MALAYSIA
MATRICULATION DIVISION
MINISTRY OF EDUCATION MALAYSIA

UJIAN PERTENGAHAN SEMESTER PROGRAM MATRIKULASI
MID-SEMESTER EXAMINATION

MATEMATIK
1 jam

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU.
DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.

ARAHAN KEPADA CALON:

Kertas soalan ini mengandungi **6** soalan.

Jawab **semua** soalan pada buku jawapan yang disediakan.

Markah penuh yang diperuntukkan bagi tiap-tiap soalan atau bahagian soalan ditunjukkan dalam kurungan pada penghujung soalan atau bahagian soalan.

Semua langkah kerja hendaklah ditunjukkan dengan jelas.

Kalkulator saintifik yang tidak boleh diprogramkan sahaja boleh digunakan.

Jawapan berangka boleh diberi dalam bentuk π, e, surd, pecahan atau sehingga tiga angka bererti, di mana-mana yang sesuai, kecuali jika dinyatakan dalam soalan.

INSTRUCTIONS TO CANDIDATE:

This question paper consists of **6** questions.

Answer **all** questions in the answer booklet provided.

The full marks for each question or section are shown in the bracket at the end of each of the question or section.

All steps must be shown clearly.

Only non-programmable scientific calculators can be used.

Numerical answers can be given in the form of π, e, surd, fractions or up to three significant figures, where appropriate, unless stated otherwise in the question.

Kertas soalan ini mengandungi **7** halaman bercetak.
*This question paper consists of **7** printed pages.*

CHOW CHOON WOOI

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LIST OF MATHEMATICAL FORMULAE

For the quadratic equation $ax^2 + bx + c = 0$:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

For an arithmetic series:

$$T_n = a + (n-1)d$$

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

For a geometric series:

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(1-r^n)}{1-r}, r \neq 1$$

For sum to infinity:

$$S_\infty = \frac{a}{1-r}, |r| < 1$$

Binomial expansion:

$$(a+b)^n = a^n + \binom{n}{1}a^{n-1}b + \binom{n}{2}a^{n-2}b^2 + ... + \binom{n}{r}a^{n-r}b^r + ... + b^n,$$

where $n \in N$ and $\binom{n}{r} = \frac{n!}{(n-r)!\,r!}$

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

$|ax| < 1$ where $n \in Z^-$ or $n \in \mathbb{Q}$

1   Given that $(x+yi)(1+i)=1+2i,$ find the values of x and y.

[5 *marks*]

2   Solve $3\log_8 x - \log_x 64 + 1 = 0$.

[7 *marks*]

3   Solve the equation $4^{2x+1} - 65\left(4^x\right) + 16 = 0$.

[7 *marks*]

4   Solve the following inequalities.

(a) $|2x-3| > 5$.

[3 *marks*]

(b) $\dfrac{1}{x+1} \le \dfrac{3}{x-1}$.

[4 *marks*]

5   (a)   A geometric sequence has seven terms. The first and the fourth terms are 8 and 216 respectively. Find the common ratio and the last term of the sequence.

[5 *marks*]

(b)   Show that the $(r+1)^{\text{th}}$ term of binomial expansion $\left(x^2 + \dfrac{1}{x}\right)^{10}$ can be written

as $T_{r+1} = \dbinom{10}{r} x^{20-3r}$. Hence, find the coefficient of x^2.

[7 *marks*]

6   Given the matrix $B = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 2 \\ 1 & 2 & 1 \end{bmatrix}$.

    (a)   Find

        (i) $|B|$.

[2 *marks*]

        (ii)   adjoint B.

[4 *marks*]

        (iii) B^{-1}.

[2 *marks*]

    (b)   Hence, solve the following system of linear equations.

$$x + 2y = 2$$
$$y + 2z = 3$$
$$x + 2y + z = 1$$

[4 *marks*]

END OF QUESTION PAPER