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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2012/2013

COURSE NAME	:	BASIC ALGEBRA (ALJABAR ASAS)
COURSE CODE	:	BBR 23703
PROGRAMME	:	IJAZAH SARJANA MUDA PENDIDIKAN SEKOLAH RENDAH DENGAN KEPUJIAN
EXAMINATION DATE	:	JUNE 2013
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FIVE** QUESTIONS FROM SIX QUESTIONS

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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Q1 (a) Solve $4x^2 - 3x - 5 = 0$ by

(i) completing the squares,
(ii) quadratic formula.

(10 marks)

(b) Show that 1 is the root of

$$x^3 - 5x^2 - x + 5.$$

Hence, factorize completely.

(10 marks)

Q2 If $P = \begin{bmatrix} 2 & -1 & 1 \\ 1 & 0 & 1 \\ 3 & -1 & 4 \end{bmatrix}$ and $Q = \begin{bmatrix} 1 & 3 & -1 \\ -1 & 5 & -1 \\ -1 & -1 & 1 \end{bmatrix}$, find PQ. Hence, deduce the matrix P^{-1}.

Express the following system in its matrix form.

$$2x - y + z = 3$$
$$x + z = 1$$
$$3x - y + 4z = 0$$

Hence solve the linear system.

(20 marks)

Q3 (a) Find the sum of $\sum_{n=1}^{8}\left(\frac{n^2}{4}+\frac{2}{3}n-1\right)$.

(4 marks)

(b) Given that the second term of an arithmetic sequence is 4 and its fourth term is -2.

(i) Find the value of first term, a and its common difference, d.
(ii) Hence, calculate the sum for this series.

(6 marks)

(c) A geometric sequence is defined as 1, 1.1, 1.21, 1.331,... Find

(i) the value of common ratio, r,
(ii) the tenth term, T_{10} and
(iii) the sum for this sequence up to 10 terms, S_{10}.

(5 marks)

(d) Given an infinite geometric series $7+\frac{14}{5}+\frac{28}{25}+\ldots$

(i) State whether this series converges or diverges.
(ii) If it is converges, evaluate its summation, S_{∞}.

(5 marks)

Q4 (a) Expand the expression $\frac{1}{\sqrt{(1-2x)}}$ until the term of x^3 using Binomial series.

(5 marks)

(b) Expand the following expressions until the term of x^3 using Binomial series.

(i) $\frac{1}{(1+x)}$

(5 marks)

(ii) $\frac{1}{(1-x)}$

(5 marks)

(c) From **Q4 (b)**, verify that $\frac{1}{(1+x)(1-x)} = 1+x^2+\ldots$

(5 marks)

Q5 (a) Sketch the graphs given. Hence, determine the domain and range

(i) $y = 5x + 6$
(ii) $y = -7$
(iii) $y = (x+8)(x-3)$
(iv) $y = -x(x^2 - 9)$

(10 marks)

(b) Given $f(x) = 2x - 7$, $h(x) = x^3 + 4$ and $g(x) = \frac{5}{x-1}$, calculate

(i) $(f \circ h)$
(ii) $(g \circ h \circ f)$
(iii) $(g^{-1} \circ f)$

(10 marks)

Q6 (a) For each equation, determine whether the conic section is circle, ellipse or parabola.

(i) $9x^2 + 4y^2 = 64$
(ii) $x^2 + y^2 = 64$
(iii) $9x^2 + 4y = 64$

(10 marks)

(b) Write the equation for a circle with radius of $2\sqrt{8}$ and center at $(-2,3)$. Write the equation in the form of $ax^2 + bxy + cy^2 + dx + ey + f = 0$. Hence, sketch the circle.

(10 marks)

KERTAS SOALAN TAMAT

FINAL EXAMINATION

SEMESTER / SESSION: Sem II 2012/2013

PROGRAMME : Ijazah sarjana muda pendidikan sekolah rendah dengan kepujian

COURSE : Basic Algebra

COURSE CODE : BBR23703

FORMULAE

Properties of Sequence

(i) $\sum_{k=1}^{n} c = cn$, c is a real number.

(ii) $\sum_{k=1}^{n} k = 1+2+3+...+n = \frac{n(n+1)}{2}$.

(iii) $\sum_{k=1}^{n} k^2 = 1^2+2^2+3^2+...+n^2 = \frac{n(n+1)(2n+1)}{6}$.

Arithmetic Series

(i) The nth term for arithmetic series, $T_n = a+(n-1)d$
where a is the first term and d is the common difference.

(ii) Common difference, $d = T_{n+1} - T_n$.

(iii) Sum for arithmetic series, $S_n = \frac{n}{2}[2a+(n-1)d]$.

Geometric Series

(i) The nth term for geometric series, $T_n = ar^{n-1}$
where a is the first term and r is the common ratio.

(ii) Common ratio, $r = \frac{T_{n+1}}{T_n}$.

(iii) Sum for geometric series, $S_n = \frac{a(r^n-1)}{r-1}$, $r>1$ or $S_n = \frac{a(1-r^n)}{1-r}$, $r<1$.

(iv) If $|r|<1$, then the infinite geometric series converges with its summation, $S_\infty = \frac{a}{1-r}$.

(v) If $|r|>1$, then the infinite geometric series diverges.

Binomial Series

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