



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Sekolah Pendidikan Profesional dan
Pendidikan Berterusan
(UTMSPACE)

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DISPB

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

COURSE CODE : DDPS 1022
KOD KURSUS

COURSE NAME : ENGINEERING MATHEMATICS / MATEMATIK KEJURUTERAAN
NAMA KURSUS

YEAR / PROGRAMME : 1 / DDPE/ DDPK/ DDPJ/ DDPA
TAHUN / PROGRAM

DURATION : 2 HOURS / 2 JAM
TEMPOH

DATE : APRIL 2016
TARIKH

INSTRUCTION/ARAHAN :

1. Answer ALL questions in the answer booklets provided.
Jawab SEMUA soalan di dalam buku jawapan yang disediakan.
2. A list of formulae is given on the last page.
Satu senarai formula diberikan pada muka surat terakhir.

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

NAME / NAMA	:
I.C NO. / NO. K/PENGENALAN	:
YEAR / COURSE TAHUN / KURSUS	:
SECTION SEKSYEN	:
LECTURER'S NAME NAMA PENSYARAH	:

This examination paper consists of ...6... pages including the cover.
Kertas soalan ini mengandungi6..... muka surat termasuk kulit hadapan

1. (a) Find the sum of the series
Dapatkan hasil tambah bagi siri

$$2 \cdot 3^2 + 3 \cdot 6^2 + 4 \cdot 9^2 + \dots + (n+1)(3n)^2.$$

- (b) In an Arithmetic series, the first term is 29 and the last term is 173.
If the number of terms is 25, find the common difference and the sum of the series.

Dalam suatu siri Aritmetik, sebutan pertama ialah 29 dan sebutan terakhir ialah 173. Jika bilangan sebutan ialah 25, dapatkan beza sepunya dan hasil tambah siri itu.

- (c) Find S_{12} of the following Geometric series.
Dapatkan S_{12} bagi siri Geometri berikut.

$$-2 + 6 - 18 + \dots$$

- (d) Find the first four terms in the expansion of
Dapatkan empat sebutan pertama dalam kembangan

$$(1 - 2x)^{-3}$$

(13 M)

2. Given
Diberi

$$A = \begin{pmatrix} 1 & 5 \\ 4 & -2 \end{pmatrix}, B = \begin{pmatrix} 2 & 0 & -1 \\ 6 & -3 & 1 \end{pmatrix}, C = \begin{pmatrix} 3 & -1 & 5 \\ 1 & 0 & 2 \\ 2 & -2 & 4 \end{pmatrix}$$

- (a) Find the matrix AB .
Dapatkan matriks AB .

- (b) Find the inverse of matrix C using the adjoint method.

3. Given the system of linear equations

Diberi sistem persamaan linear

$$\begin{aligned}x - 2y + 3z &= 4 \\2x + y - 4z &= 3 \\-3x + 4y - z &= -2\end{aligned}$$

- (a) Solve the equations using Gauss elimination method.

Selesaikan persamaan dengan kaedah penghapusan Gauss.

- (b) Solve for value of
- z
- only using The Cramer's rule.

Selesaikan untuk nilai z sahaja menggunakan kaedah Petua Cramer.

(10 M)

4. Given
- $\underline{a} = -2i + 3j + k$
- ,
- $\underline{b} = i - 5j + 2k$
- and
- $\underline{c} = 7i + 4j + 5k$
- , find :
-
- Diberi $\underline{a} = -2i + 3j + k$, $\underline{b} = i - 5j + 2k$ dan $\underline{c} = 7i + 4j + 5k$ dapatkan:*

(a) $\underline{a} \cdot (\underline{b} + \underline{c})$

(b) $\underline{a} \times \underline{b}$

- (c) a unit vector perpendicular to both vectors
- \underline{a}
- and
- \underline{b}
- .

vektor unit yang serenjang dengan vektor \underline{a} dan vektor \underline{b} .

- (d) the angle between the vectors
- \underline{a}
- and
- $(\underline{b} + \underline{c})$
- .

sudut di antara vektor \underline{a} dan $(\underline{b} + \underline{c})$.

(10 M)

5. (a) Find the parametric equations of the line that passes through the point
- $(1, -3, 4)$
- and parallel to the line
- $\underline{r} = (2i + 3j - k) + t(4i - j + 5k)$
- .
-
- Dapatkan persamaan berparameter bagi garis yang mengandungi titik $(1, -3, 4)$ dan selari dengan garis $\underline{r} = (2i + 3j - k) + t(4i - j + 5k)$.*

- (b) Find the Cartesian equation of the plane which contains the point $(2, 4, -3)$ and parallel to the plane $x - 5y + 2z = 6$.

Dapatkan persamaan Cartesian bagi satah yang mengandungi titik $(2, 4, -3)$ dan selari dengan satah $x - 5y + 2z = 6$.

(6 M)

6. (a) Simplify

Ringkaskan $(1 - 2i)^2 + 4i(3 + i)$

- (b) Find the values of p and q if $(p + qi)(5 + i) = 3 - 2i$.

Dapatkan nilai-nilai bagi p dan q jika $(p + qi)(5 + i) = 3 - 2i$.

- (c) Plot the points $z_1 = 2 - 2i$ and $z_2 = 3 + \sqrt{3}i$ on the same Argand diagram. Find the polar representation of z_1 and z_2 . Hence, find $z_1 z_2$ in polar form.

Plotkan titik-titik $z_1 = 2 - 2i$ dan $z_2 = 3 + \sqrt{3}i$ dalam Argand Diagram yang sama. Dapatkan perwakilan kutub bagi z_1 dan z_2 . Seterusnya,

2142 *malam untuk kuliah*

(14 M)

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

Appendix

Theorems of Finite series

1. $\sum_{r=1}^n 1 = n$
2. $\sum_{r=1}^n c = cn$
3. $\sum_{r=1}^n r = \frac{n(n+1)}{2}$
4. $\sum_{r=1}^n r^2 = \frac{n(n+1)(2n+1)}{6}$
5. $\sum_{r=1}^n r^3 = \left(\frac{n(n+1)}{2}\right)^2$

Binomial Theorem for any positive integer, n

$$(a+x)^n = a^n + {}^n C_1 a^{n-1} x + {}^n C_2 a^{n-2} x^2 + {}^n C_3 a^{n-3} x^3 + {}^n C_4 a^{n-4} x^4 + \dots + x^n = \sum_{r=0}^n {}^n C_r a^{n-r} x^r$$

The Binomial Theorem when n is not a positive integer

$$(1+x)^n = 1 + nx + \frac{n(n-1)}{2!} x^2 + \frac{n(n-1)(n-2)}{3!} x^3 + \dots$$

Arithmetic Progression

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

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

Geometric Progression

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

$$S_n = \frac{a(r^n - 1)}{r - 1} \quad \text{or} \quad S_n = \frac{a(1 - r^n)}{1 - r}$$

Complex numbers

$$z_1 z_2 = r_1 r_2 [\cos(\theta_1 + \theta_2) + i \sin(\theta_1 + \theta_2)]$$

$$z_1 / z_2 = (r_1 / r_2) [\cos(\theta_1 - \theta_2) + i \sin(\theta_1 - \theta_2)]$$

$$z^n = r^n (\cos n\theta + i \sin n\theta)$$