

QS025  
Mathematics  
Semester II  
Session 2012/2013  
1 hour

QS025  
Matematik  
Semester II  
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  $\pi$ ,  $e$ , 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  $\pi$ ,  $e$ , 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.*

## LIST OF MATHEMATICAL FORMULAE

## Numerical Methods

## Iteration Method:

$$x_{n+1} = g(x_n)$$

## Newton-Raphson Method:

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}, \quad n = 1, 2, 3, \dots$$

## Conics

## Circle:

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

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

$$xx_1 + yy_1 + g(x + x_1) + f(y + y_1) + c = 0$$

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

$$d = \sqrt{a^2 + b^2 + 2ga + 2fb + c}$$

## Parabola:

$$(x - h)^2 = 4p(y - k)$$

$$(y - k)^2 = 4p(x - h)$$

$$F(h + p, k) \text{ or } F(h, k + p)$$

## Ellipse:

$$\frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$$

$$F(h \pm c, k) \text{ or } F(h, k \pm c)$$

1 Find

(a)  $\int_0^1 \frac{3+e^x}{e^x} dx.$

[3 marks]

(b)  $\int \sin^2 x \cos x dx.$

[4 marks]

2 Using integration by parts, solve

$$\int 2x \sin 2x dx.$$

[5 marks]

3 Find the particular solution of the differential equation

$$(x+2) \frac{dy}{dx} = y+2, \quad y(0)=1.$$

[7 marks]

4 Show that the equation  $2x + e^x - 2 = 0$  has a root between  $x = 0$  and  $x = 1$ . Using the Newton-Raphson method and taking  $x_0 = 0.7$ , find the root correct to four decimal places.

[7 marks]

5 (a) Using partial fractions, find  $\int \frac{3x^2 - 2x + 2}{(x-1)(x^2 + 2)} dx$ .

[7 marks]

(b) Given functions  $f(x) = x + 7$  and  $g(x) = x^2 - 5$ , find the area of the region bounded by  $f(x)$  and  $g(x)$ .

[5 marks]

6 A circle passes through the points  $A(-2, 4)$ ,  $B(7, 7)$  and the centre lies on the line  $y - x = 1$ . Find the radius and standard equation of the circle.

[12 marks]

**END OF QUESTION PAPER**