GRADE 11
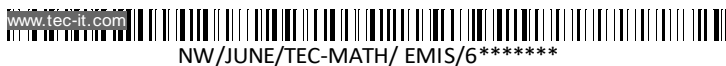
TECINICAL MATHEMATICS P1

MID YEAR EXAMINATION 2018

MARKS: 100
TIME: 2 hours

This question paper consists of 6 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1.   This question paper consists of   7   questions, answer all questions.

2.   Clearly show ALL calculations, diagrams, graphs, et cetera that you used to determine the answers.

3.   Answer only will NOT necessarily be awarded full marks.

4.   If necessary, round off answers to TWO decimal places, unless stated otherwise.

5.   Diagrams are NOT necessarily drawn to scale.

7.   You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.

8.   Write neatly and legibly.

QUESTION 1

Solve the following equations

1.1 $x(x-4) = -4$ (3)

1.2 $2x^2 - 3x - 4 = 0$ (Leave your answer correct to TWO decimal places) (5)

1.3 $3x^{\frac{2}{3}} - 7x^{\frac{1}{3}} + 2 = 0$ (4)

1.4 $\dfrac{1}{x+1} + \dfrac{2x}{x-1} = 1$ (5)

[17]

QUESTION 2

2.1 Solve the following inequality
$x^2 + 13x + 36 < 0$ (3)

2.2 Solve the following simultaneous equations

$3y + x = 2$ and $y^2 + x = xy + y$ (7)

2.3 Given that: $p^2 = q^2 + r^2 - 2qr\cos\hat{P}$

Then: $\cos\hat{P} = $ …………………. (3)

[13]

QUESTION 3

3.1 Given the equation $x^2 + x + t = 0$

3.1.1 Show that $\dfrac{\sqrt{1-4t}-1}{2}$ and $\dfrac{-\sqrt{1-4t}-1}{2}$ are roots. (2)

3.1.2 Determine the value(s) of t for which roots are non-real. (3)

3.2 Discuss the nature of the roots of the equation $2x^2 + x = 0$ (3)

3.3 For which values of r will $x^2 - 2x - 2r = 0$ have equal roots. (3)

[11]

QUESTION 4

4.1 Simplify the following without the use of a calculator:

4.1.1 $(0,125)^{-\frac{1}{3}}$ (3)

4.1.2 $\dfrac{9^{n-1} \cdot 27^{3-2n}}{81^{2-n}}$ (3)

4.1.3 $\log_3 15 - \log_3 10 + \log_3 18$ (4)

4.2 Solve the following:

4.2.1 $2^{\frac{x^2}{2}} = 4^x$ (5)

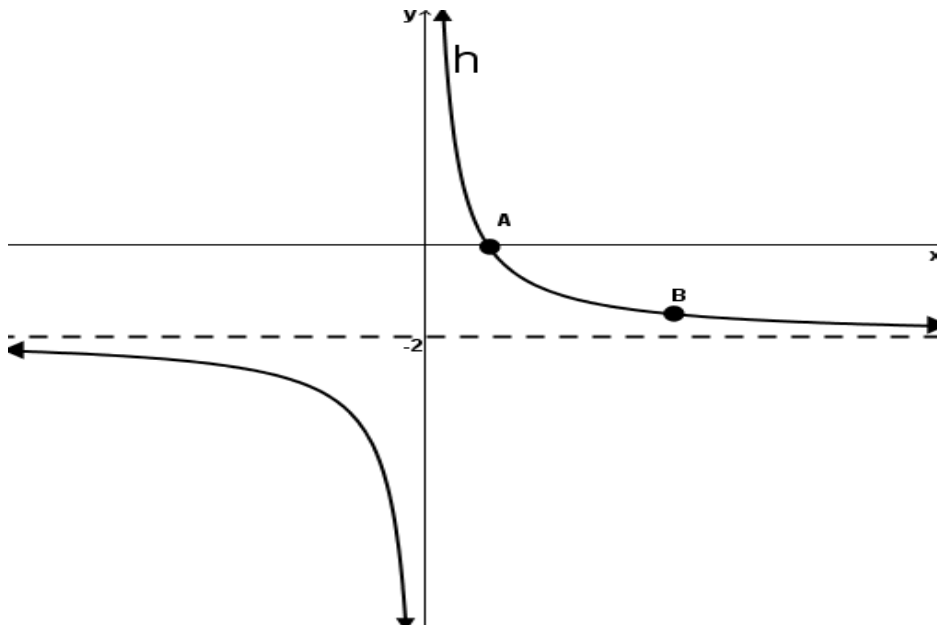4.2.2 $3 \cdot 2^x - 2^{x-1} = 80$ (5)

4.2.3 $5^x = 2$ (2)

4.2.4 $2 \log x = 2$ (2)

4.2.5 $\log(x^2 + x - 2) - 1 = 0$ (5)

[29]

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QUESTION 5

Consider the function $h(x) = \dfrac{a}{x} + q$, Point B$(2\ -1)$ is on the graph and A is a point on the x - axis.

5.1	Determine the values of a and q	(3)
5.2	Write down the equation of the axis of symmetry of h where $m > 0$.	(3)
5.3	Write down the equation of the asymptote of the new graph of $r(x) = h(x) + 3$	(2)

[8]

QUESTION 6
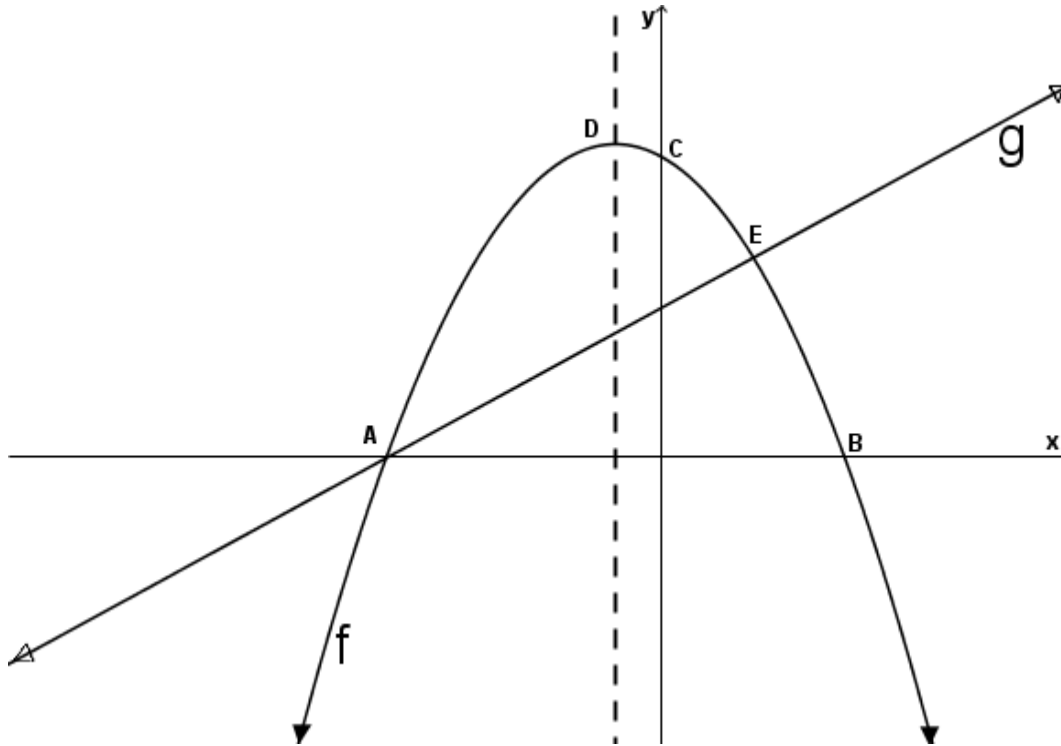
Consider the function $g(x) = 3^x - 1$

6.1	Write down the equation of the asymptote of g.	(1)
6.2	Calculate the x-intercept of g.	(3)
6.3	Sketch a neat graph of g, showing all intercepts and asymptotes.	(3)
6.4	Write down the range of g.	(1)

[8]

QUESTION 7

The diagram below shows the graphs of $g(x) = x + 3$ and $f(x) = -x^2 - x + 6$

Two graphs intersect at A and E. A, B and C are the intercepts of f.

7.1	Determine the length of AB	(4)
7.2	Write down the coordinates of C.	(1)
7.3	Determine the coordinates of D, the turning point of f.	(4)
7.4	Calculate the average gradient between the points D and C.	(3)
7.5	For which values of x is $f(x).g(x) \geq 0$?	(2)

[14]

TOTAL:100