COMPETITIVE ENTRANCE 2015 SESSION
Department: Civil Engineering and Forestry Techniques, Electrical and Power Engineering, Mechanical Engineering and Computer Science
1st Cycle Option ALL
Paper 2: Mathematics **Duration 3hrs**

1. The partial fraction decomposition form of $\frac{2x^2-1}{x^2(x-1)}$ is

a) $a+\frac{b}{x}+\frac{c}{x^2}+\frac{d}{x-1}$

b) $a+\frac{b}{x}+\frac{c}{x^2}+\frac{d}{x-1}a+\frac{bx+c}{x}+\frac{d}{x-1}$

. c) $\frac{bx+c}{x^2}+\frac{d}{x-1}$ d) $\frac{ax+b}{x^2}+\frac{c}{x-1}$

La décomposition en éléments simple $\frac{2x^2-1}{x^2(x-1)}$. est

b) $a+\frac{b}{x}+\frac{c}{x^2}+\frac{d}{x-1}$

b) $a+\frac{b}{x}+\frac{c}{x^2}+\frac{d}{x-1}a+\frac{bx+c}{x}+\frac{d}{x-1}$

. c) $\frac{bx+c}{x^2}+\frac{d}{x-1}$ d) $\frac{ax+b}{x^2}+\frac{c}{x-1}$

2. The coefficient of the term in x^0 in the binomial expansion of $\left(2x-\frac{1}{x^2}\right)^6$ is

a) 240 b) 480 c) 180 d) 20

Les coefficients des termes en x^0 du développement de $\left(2x-\frac{1}{x^2}\right)^6$ est

b) 240 b) 480 c) 180 d) 20

3. The smallest positive value of x which satisfy the equation $\cos\left(x+\frac{\pi}{12}\right)=\frac{1}{2}$ is

a) $\frac{\pi}{3}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{6}$ d) $\frac{5\pi}{12}$

La plus petite valeur de x qui satisfait l'équation $\cos\left(x+\frac{\pi}{12}\right)=\frac{1}{2}$ est :

b) $\frac{\pi}{3}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{6}$ d) $\frac{5\pi}{12}$

4. The complex number $Z=-1+i$ satisfies$\frac{z+1}{z+2-i}=\boldsymbol{a}+i$. The value of **a** is:

a)-1 b) 1 c) 0 d) 2

le nombre complex $Z=-1+i$ satisfait $\frac{z+1}{z+2-i}=\boldsymbol{a}+i$. La valeur de **a** est.

a)-1 b) 1 c) 0 d) 2

5. The coordinates of the turning point on the curve with parametric equations $x=t^3, y=(1+t)^2$ are:

a) (0,1) b) (-1,0) c) (1,4) d) (-1,4)

La coordonnée du point minimum de la courbe ayant pour équation paramétrique $x=t^3, y=(1+t)^2$ sont:

a) (0,1) b) (-1,0) c) (1,4) d) (-1,4)

6. $\int\frac{5}{1+x^2}dx=\cdots..$

a) $\frac{-10x}{(1+x^2)^2}+C$ b) $\frac{5}{2x}In(1+x^2)+C$

.c) $5arctanx+C$ d) $5x-\frac{5}{x}+C$

7. If $f(x) = e^{\frac{1}{x}}$, then $f'(x) =$

   a) $\frac{-e^{\frac{1}{x}}}{x^2}$ b) $-e^{\frac{1}{x}}$ c) $\frac{e^{\frac{1}{x}}}{x}$ d) $\frac{e^{\frac{1}{x}-1}}{x}$

   Si $f(x) = e^{\frac{1}{x}}$ alors $f'(x) =$

   b) $\frac{-e^{\frac{1}{x}}}{x^2}$ b) $-e^{\frac{1}{x}}$ c) $\frac{e^{\frac{1}{x}}}{x}$ d) $\frac{e^{\frac{1}{x}-1}}{x}$

8. The center of the circle:

   $2x^2 + 2y^2 - 2x + y - \frac{1}{2} = 0$ is:

   a) (1/2 , ¼) b) (2, -1) C) (-1/2, -1/4) d) (1/2,- ¼)

   Le centre du cercle $2x^2 + 2y^2 - 2x + y - \frac{1}{2} = 0$ est:

   a) (1/2 , ¼) b) (2, -1) C) (-1/2, -1/4) d) (1/2,- ¼)

9. Given the differential equation $cosx\frac{dy}{dx} = ysinx$, then:

   a) $y = In(secx) + k$ b) $Iny = In(secx) + k$

   ,c) $y = secx + k$ d) $Iny = secx + k$

   Sachant que l'équation différentielle

   $cosx\frac{dy}{dx} = ysinx$, Alors :

   b) $y = In(secx) + k$ b) $Iny = In(secx) + k$

   c) $y = secx + k$ d) $Iny = secx + k$

10. The range of values of p for which the expression $x^2 + 4px + p$ is:

    a) $p < 0 \; or \; p > \frac{1}{4}$ b) $p < 0 \;\; and \; p > \frac{1}{4}$

    , c) $0 < p < \frac{1}{4}$ d) $0 \leq p \leq \frac{1}{4}$

    L'intervalle des valeurs de p pour lesquelles $x^2 + 4px + p$ est:

    b) $p < 0 \; or \; p > \frac{1}{4}$ b) $p < 0 \;\; and \; p > \frac{1}{4}$

    , c) $0 < p < \frac{1}{4}$ d) $0 \leq p \leq \frac{1}{4}$

11. $\int_0^1 \frac{x+1}{x^2+2x-3} dx =$.. ….

    a) $-In\sqrt{3}$ b) $\frac{-In\sqrt{3}}{2}$

    ,c) Does not exist d) None of the above

    $\int_0^1 \frac{x+1}{x^2+2x-3} dx =$.. ….

    $a) \; -In\sqrt{3}$ b) $\frac{-In\sqrt{3}}{2}$

    b) N'est existe pas d) aucun

12. Let $A = 3\pi r^2 - 4\pi r$. The rate of change of A with respect to r when r = 4 is

    a) 20π b) 32π c) 24π d) ○ 8π

    Soit $A = 3\pi r^2 - 4\pi r$. la fréquence de variation de A en fonction de r lorsque r = 4 est

    $a)$ 20π b) 32π c) 24π d) ○ 8π

13. If $e^{\sqrt{3x}}sinx = Re^{\sqrt{3x}}\sin(x+\alpha)$, then

a) $R = 1, \alpha = 0$ b) $R = \sqrt{3}, \alpha = 0$

, c) $R = 1, \alpha = \frac{\pi}{4}$ d) $R = 1, \alpha = \frac{\pi}{2}$

14. Si $e^{\sqrt{3x}}sinx = Re^{\sqrt{3x}}\sin(x+\alpha)$, alors

b) $R = 1, \alpha = 0$ b) $R = \sqrt{3}, \alpha = 0$

,c) $R = 1, \alpha = \frac{\pi}{4}$ d) $R = 1, \alpha = \frac{\pi}{2}$

15. If $\int_1^2 f(x-c)dx = 5$, where c is a constant, then $\int_{1-c}^{2-c} f(x)dx =$ ……..

a) $5-c$ b) 5 c) $5+c$ d) $c-5$

Si$\int_1^2 f(x-c)dx = 5$, avec c constant, alors $\int_{1-c}^{2-c} f(x)dx =$ ……..

a) $5-c$ b) 5 c) $5+c$ d) $c-5$

16. Given that $y = x^3e^{x^3}$, then $\frac{dy}{dx} =$

a) $3x^2e^{x^3}$ b) $(3x^2+3x^5)e^{x^3}$

.c) $(3x^2+x^3)e^{x^3}$ d) $3x^2e^{x^2}$

Sachant que$y = x^3e^{x^3}$, alors $\frac{dy}{dx} =$

a) $5-c$ b) 5 c) $5+c$ d) $c-5$

17. The equation of a line through the origin and perpendicular to $3x-2y+4=0$ is :

a) $2x+3y=0$ b) $3x-2y=0$

,c) $9x-6y-26=0$ d) $3x+2y=0$

18. L'equation de la droite passant par l'origine et perpendiculaire a $3x-2y+4=0$ est :

b) $2x+3y=0$ b) $3x-2y=0$

,c) $9x-6y-26=0$ d) $3x+2y=0$

19. Given that $\frac{a!}{(a-2)!} = 2$, where a is positive, then the value of a is:

a) 2 b) 1 c) 4 d) 5

Sachant que $\frac{a!}{(a-2)!} = 2$, avec a positif, alors la valeur de a est :

a) 2 b) 1 c) 4 d) 5

20. The range of the function $f: x \to \frac{1+3x}{x}, x \neq 0$ is

a) $x \in \mathbb{R},\ x \neq 3$ b) $x \in \mathbb{R},\ x \neq -3$

,c) $x \in \mathbb{R},\ x \neq \frac{1}{3}$ d) $x \in \mathbb{R},\ x \neq \frac{-1}{3}$

L'intervalle de la fonction $f: x \to \frac{1+3x}{x}, x \neq 0$ is

b) $x \in \mathbb{R},\ x \neq 3$ b) $x \in \mathbb{R},\ x \neq -3$

,c) $x \in \mathbb{R},\ x \neq \frac{1}{3}$ d) $x \in \mathbb{R},\ x \neq \frac{-1}{3}$

21. The value(s) of m for which $y = mx-3$ is tangent to $y = x^2+1$ are:

a) 1 b) ± 2 c) 2