

COMPETITIVE ENTRANCE**2014****SESSION**

Department: Civil Engineering and Forestry Techniques, Electrical and Power Engineering, Mechanical Engineering and Computer Science

1st Cycle**Option: ALL****Paper 2: Mathematics****Duration 3hours**

- If $\left| \frac{2x+5}{x-1} \right| < 1$, then the set of values of x that satisfies it is:
 A) $-3 < x < 4$ B) $-18 < x < -4$ C) $-6 < x < \frac{4}{3}$ D) $x < \frac{4}{3}$ and $x < -6$
 - The value of x if $32^x = 0.25$ is
 A) $\frac{2}{3}$ B) $\frac{5}{2}$ C) $\frac{2}{5}$ D) $\frac{4}{3}$
 - $f(x) \equiv x^3 - 2x^2 - 11x + 52$ is exactly divisible by:
 A) $x - 5$ B) $x + 4$ C) $5x - 6$ D) $x - 2$
 - If $\left(\frac{x}{(x-4)(x-1)} \right) \equiv \frac{a}{3(x-4)} - \frac{1}{3(x-1)}$ then a is:
 A) 1 B) -1 C) 4 D) -4
 - If $\frac{x^3}{(x+1)(x-3)} = px + p + \frac{1}{4(x+1)} + \frac{27}{4(x-3)}$ then p and q are respectively:
 A) 1, 2 B) 2, 1 C) -2, 1 D) 1, -2
 - $x = 3 - \tan\theta$, $y = 3\cos\theta$ in terms of x and y only:
 A) $y^2 = \frac{9}{x^2-6x+10}$ B) $y^2 = \frac{9}{x^2+6x+10}$ C) $y = \frac{9}{x^2-6x-10}$ D) $y = \frac{9}{x^2+6x+10}$
 - The point $(-1, 2)$ on the curve $x = t$, $y = t^3 - 3t$ and is:
 A) Minimum point B) maximum point C) point of inflexion D) none of these.
- Questions 8 and 9 are answer using the data on question 8
- A particle of mass m kg falls from rest under gravity in a medium which the resistance is of magnitude $\frac{mgv^4}{c^4}$ where v is the speed of the particle and c is a constant. The time the particle takes to attain a speed of $\frac{c}{2} \text{ ms}^{-1}$ is:
 A) $t = \frac{c}{2g} \left[\ln 3 + 2 \tan^{-1} \left(\frac{1}{2} \right) \right]$ B) $t = \frac{c}{2g} \left[\ln 2 + 3 \tan^{-1} \left(\frac{1}{2} \right) \right]$
 C) $t = \frac{c}{8g} \left[\ln 3 + 2 \tan^{-1} \left(\frac{1}{2} \right) \right]$ D) $t = \frac{c}{4g} \left[\ln 3 + 2 \tan^{-1} \left(\frac{1}{2} \right) \right]$
 - If $g = 10$ and $c = 2$, the time for the speed $\frac{c}{2} \text{ ms}^{-1}$ to be obtained will now be:

- A) 5.48 B) 8.08 C) 1.48 D) 2.78
10. $\int_0^{-2} \frac{1}{1-x} dx$ is A) not possible B) $-\ln 3$ C) $\ln 3$ D) $-\frac{1}{2}\ln 3$
11. $\int_0^1 \frac{1}{1+a^2x^2} dx = \frac{\pi}{4}$ Then the value of a is: A) 1 B) -1 C) $\frac{\pi}{4}$
D) $-\frac{\pi}{4}$
12. $\int \sin^4 \theta d(\sin \theta)$ is the same as integrating wrt θ is:
A) $\sin^4 \theta \cos \theta d\theta$ B) $\sin^5 \theta \cos \theta$ C) $\sin^3 \theta \cos \theta$ D) none of the above
13. The eight term of a GP is 256 and the first term is 2, its common ratio is
A) 7 B) 2 C) 128 D) 128
14. A group of 2 boys and 3 girls is to be chosen from 5 boys and 4 girls. If one girl refuses to serve in the same committee as one particular boy, the number of possible groups are:
A) 40 B) 12 C) 10
D) 28
15. Which of the following is not an equation of a circle?
A) $x^2 + y^2 - x = 0$ B) $x^2 + 2y^2 + x - 2y = 0$
C) $3x^2 + 3y^2 = 1$ D) $x^2 + y^2 - 6x - 8y = 2$
16. When two circles with centers C_1 and C_2 and radii r_1 and r_2 respectively touch externally C_1C_2 is
A) $r_1^2 + r_2^2$ B) $r_1 + r_2$ C) $|r_1 - r_2|$ D) $r_1 r_2$
17. If z is any cube root of unity, the value of $z^2 + z$ is
A) 1 B) 0 C) -1 D) 2
18. The sum to infinity of a GP is 5 times its first term. The common ratio is:
A) 1 B) 1/5 C) -4 D) 4/5
19. The Cartesian equation of the curve defined parametrically by $x = 2\sin \theta, y = \cos^2 \theta$ is:
A) $4y + x^2 - 4 = 0$ B) $y + 4x^2 - 4 = 0$ C) $4y^2 + x^2 - 4 = 0$ D) $y^2 + x^2 = 0$
20. The probability function of a discrete random variable X is given by:
 $f(x) = K(3x + 1), x = 0, 1, 2, 3$.
The value of K is: A) 1/11 B) 1/22 C) 1/44 D) 1/24
21. $E(X)$ is: A) 24/11 B) 44/22 C) 43/22 D) 41/22

22. What is the exact value of the logarithm of 8 to base 64?
 A) 2 B) $\frac{1}{2}$ C) 6 D) 8
23. Expressing $1 + \log_{10} 3$ as a single logarithm gives:
 A) $\log_{10} 30$ B) $\log_{10} 3$ C) $\log_{10} 4$ D) $\log_{10} \left(\frac{3}{10}\right)$
24. An AP has 12 terms. If its 5th term is 7 and it's common difference is 6, then the sum of the AP is:
 A) 300 B) 396 C) 192 D) 196
25. The limits of $\frac{x^3-3x^2+3}{x-1}$ at 1 is: A) 0 B) 12 C) -3 D) 3

COMPETITIVE ENTRANCE**2013 SESSION**

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1st Cycle**Option ALL****Paper 2: Mathematics****Duration 3hours**

1. The value of x given that $32^x = 0.25$ is
A: 2/5 B: 5/2 C: -2/5 D: 4
2. The eight term of the geometric sequence is 256. If the first member of the sequence is 2 then common ratio is:
A: 2 B: 7 C: 128 D: 4
3. Given the function $f: x \rightarrow \frac{2x}{4-3x}; x \in \mathbb{R} - \left\{\frac{4}{3}\right\}$. The range is **A: $\mathbb{R} - \{4/3\}$. B: $\mathbb{R} - \{2/3\}$. C: $\mathbb{R} - \{-3/21\}$. D: $x \in \mathbb{R}$**
4. The set of values for x for which $(x-3)(x-4) < (x-3)$ is
A: $x < 4$ B: $x > 4$ C: $5 < x < 3$ D: $3 < x < 5$
5. The complex number $Z = \frac{2-i}{1-i}$ can be reduced to the form $x + iy$, where x and y are real numbers. Then the values of x and y are;
A: 3/2 and $\frac{1}{2}$ B: $\frac{1}{2}$ and -3/2 C: -1/2 and -3/2 D: 3/2 and $\frac{1}{2}$
6. $\int_0^2 \frac{x}{1+x^2} dx$ is
A: $\ln(1/5)$ B: $\ln(5/2)$ C: $\ln(\sqrt{5})$ D: $\ln(5^2)$
7. The sequence whose n th term is given by $S_n = n(2n+1)$ is **A: a GP B: an AP C: an infinite sequence D: a finite sequence**
8. The coordinates of the point on inflexion of the curve $f(x) = x^4 - 4x^3$ are;
A: (3, -27) B: (0,0) C: D: (3,27)
9. i^{1003} is **A: 1 B: i C: -i D: -1**
10. If $\log_5 3 = x$, then the value of 625^x is **A: 12 B: 81 C: 64 D: 60**
11. $\lim_{x \rightarrow 1} \left(\frac{x^3-1}{x-1}\right)$, where $x \neq 1$ gives