WEEKLY EXAM 2080/09/08

Subject: Mathematics　　　　　　　GRADE XII　　　　　　　F.M.: 40

Time : 1:30 hrs.　　　　　　　　SET A　　　　　　　　P.M.: 20

Group 'A'　　　　　　　　　　　　　　　　　　[1×5=5]

1. The sum of all odd numbers between 100 and 200 is
   a) 7500　　　b) 7450　　　　　　c) 7560　　　　　　d) 7600

2. Cramer's rule is applicable only to get an unique solution when_____
   a) $\Delta_z \neq 0$　　b) $\Delta_x \neq 0$　　　c) $\Delta \neq 0$　　　d) $\Delta_y \neq 0$

3. In any triangle ABC, the sum of the sine of angles is equal to
   a) $\dfrac{R}{S}$　　　b) $\dfrac{R}{2S}$　　　c) $\dfrac{S}{R}$　　　d) $\dfrac{S}{2R}$

4. The differential equation of $y = mx + c$ is (m and c are arbitrary constants)
   a) $\dfrac{d^2y}{dx^2} = 0$　　　　　　b) $y = x\dfrac{dy}{dx} + c$
   c) $xdy + ydx = 0$　　　　　　d) $ydx - xdy = 0$

5. What is the vector perpendicular to both the vectors $\hat{i} - \hat{j}$ and $\hat{i}$?
   a) $\hat{i}$　　　b) $-\hat{j}$　　　c) $\hat{j}$　　　d) $\hat{k}$

Group 'B'　　　　　　　　　　　　　　　　　　[7×5=35]

6. a) How many diagonals are there in a polygon with n sides? [2]
   b) Determine consistency of the system of linear equations.
      $3x - 2y = 3, -4y + 6x = 9$ [3]

7. a) State the principle of mathematical induction. [2]
   b) Using principle of Induction Prove that $4^n - 1$ is divisible by 3. [3]

8. a) Solve the triangle if $a = 2, b = \sqrt{6}$ and $c = \sqrt{3} - 1$. [3]
   b) Using sine law, prove that: $\tan\dfrac{1}{2}(C-A) = \dfrac{c-a}{c+a} \cdot \cot\dfrac{B}{2}$. [2]

9. a) Prove that:
   i) $1 + \omega^n + \omega^{2n} = 3$, if n is multiple of 3 [2]
   ii) $1 + \omega^n + \omega^{2n} = 0$, if n is not multiple of 3, $n \in N$ [2]
   b) What do you mean by argument of complex number? [1]

10. a) Find the parametric equations of the circle $x^2 + y^2 = 25$.

b) If $\left|\vec{a} + \vec{b}\right| = \left|\vec{a} - \vec{b}\right|$, prove that $\vec{a}$ is perpendicular to $\vec{b}$.

c) Prove that the points A, B, C with position vectors $\vec{a}, \vec{b}, \vec{c}$ are collinear if and only if $\left(\vec{b} \times \vec{c}\right) + \left(\vec{c} \times \vec{a}\right) + \left(\vec{a} \times \vec{b}\right) = \vec{0}$.

11. a) Differentiate between general and particular solution in differential equation. [1]

b) Evaluate $\int \dfrac{x^2}{(x+2)(x+3)^2} \, dx$ [4]

12. a) Solve: $\dfrac{dy}{dx} = \dfrac{1 + y^2}{1+x^2}$ [3]

b) Find the differential equation of the curve $y = ae^x + be^{-x}$. [2]

& Best of Luck ca