RAMMANI MULTIPLE CAMPUS

Class: XI
Subject: Mathematics

BOARD EXAMINATION 2079

Time: 3 hrs

FM: 75
PM: 32

Students are required to solve their problems in their own words as far as practicable.
Figures in the margin indicate full marks.

GROUP A

Rewrite the correct answer in your answer sheet. **[11 × 1 = 11]**

1. The set of intelligent students in a class is
   a) Singleton set b) Null set c) Finite set d) Not a well defined
2. The domain of the function $f(x) = \frac{1}{\sqrt{x-1}}$ is
   a) R-{1} b) [1,∞) c)(1,∞) d) [1,∞]
3. The period of sin2x is
   a) π b) $\frac{\pi}{2}$ c)$\frac{\pi}{6}$ d) 2π
4. In triangle ABC, $\angle A : \angle B : \angle C = 1:2:3$ then the value of c, when $b = \sqrt{3}$
   a) 2 b) 1 c) 8 d)12
5. If a cow moves in a such a way that its distance from a fixed point is equal to its distance from a fixed line then the path followed by the cow is
   a) Circle b) Ellipse c) Hyperbola d) Parabola
6. The value of m for which the vectors $\vec{a} = \vec{i} - 2\vec{j} + 4\vec{k}$ and $\vec{b} = 2\vec{i} + 7\vec{j} + m\vec{k}$ are orthogonal
   a) 3 b) $\frac{-1}{2}$ c) 2d) -4
7. The probability of impossible event is
   a) 0 b) 1 c) $\frac{1}{2}$ d) $\frac{1}{3}$
8. If $(x+y)^7 = x^3y^4$ then $\frac{dy}{dx} =$
   a)$\frac{y}{x}$ b) $-\frac{y}{x}$ c)$\frac{x}{y}$ d)$-\frac{x}{y}$
9. The value of $\lim_{x \to 0} \frac{\sin 2x}{x} =$
   a) 0 b) 1 c)2 d) 4
10. The drawback of Newton Raphson method to find approximate root of an equation is
    a) Can't be applied when the value of first derivative is zero
    b) Can't be applied when the value of first derivative is negative
    c) Can't be applied when the value of first derivative is positive
    d) Can't be applied when the value of first derivative is finite
11. The total cost function is given by $C = x^2+3x-2$ then the value of marginal cost at $x = 4$ is
    a) 10 b) 11 c) 12 d) 13s

GROUP B

[8 x 5 = 40]

12. A function $f(x) = x^2-4x+3$ is given. Answer the following questions
   a) Write the algebraic type of the function.
   b) State its domain.
   c) Write its vertex.
   d) Write any one property of sketching the curve.
   e) Write the name of the locus of the curve.

13. A rubber balls rebound $\frac{4}{5}$th of its height of previous fall. Find the total distance covered by the ball before coming to rest if it is droped from a height of 120m

14. a) In any triangle ABC, prove that: $\tan\left(\frac{B-C}{2}\right) = \frac{b-c}{b+c}\cot\frac{A}{2}$ [3]

b) Express the vector $\vec{r} = (2,-3)$ as a linear combination of $\vec{a} = (1,2)$ and $\vec{b} = (1,1)$ [2]

15. Calculate the Karl Pearson coefficient of skewness of the following data

X	0-10	10-20	20-30	30-40	40-50
f	5	15	12	7	5

16. Define continuity of a function at a point. What are its different types? Also write the condition of increasing function, decreasing function, and concave upward.

17. a) Evaluate $\int \frac{(x-1)dx}{x+1}$

b) Evaluate: $\int \frac{\cot x\, dx}{\ln(\sin x)^3}$

18. Using Trapezoidal Rule, evaluate: $\int_0^1 \frac{dx}{1+x}$, n = 4. Also calculate error with respect to its exact value. [3]

19. Find the minimum cost and minimum average cost. If the total cost function of producing quantity Q is $C = 36Q - 15Q^2 + 2Q^3$.

[3 x 8 = 40]

GROUP C

20. a) Define absolute value of a complex number. Find the absolute value of (2+3i) [2]

b) For any two real number x and y, prove that $|x + y| \le |x| + |y|$ [2]

c) Prove that: $\begin{vmatrix} 1+x & y & z \\ x & 1+y & z \\ x & y & 1+z \end{vmatrix} = 1 + x + y + z$ [4]

21. a) Find the distance between the parallel lines $x+3y = 9$ and $2x+6y = 11$ [2]

b) Find the angles between the lines represented by $2x^2+7xy+y^2 = 0$ [2]

c) If $lx + my = 1$ touches the circle $x^2 + y^2 = a^2$, prove that: $l^2+m^2 = \frac{1}{a^2}$ [2]

d) Find the equation of normal to the parabola $y^2 = 4ax$ in slope form [2]

22. a) Evaluate: $\lim_{x \to 0} \frac{1-\cos x}{2x^2}$ [3]

b) Using First principle, find the derivative of $\sqrt{2x+3}$ with respect to x [3]

c) Using method of integration find the area between the curves $y=x$ and $y^2 = 4x$