Mid-West University

Examinations Management Office

Surkhet ,Nepal

Final Examinations -2079

Bachelor level/ B.Sc.CSIT /1st Semester — Full Marks : 60

Time: 3 hrs — Pass Marks :30

Subject : Mathematics I (MTH 414)

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Group A

Long Answer Question (Attempt any three) [3 x 8 =24]

1. In a group of students Marketing, Statistics and Finance. It is found that 50 read Marketing, 37 read Statistics, 42 read Finance, 12 read Marketing only ,18 read Finance only, 10 read Marketing and Finance only and 8 read Statistics and Finance only. How many students read
   - i) all three subject?
   - ii) are there altogether?
   - iii) at least one subjects?.
2. A firm has a demand function $P = 108 - 5x$ and the total cost function $(TC) = x^2 - 12x$. Find the price at which the profit is maximum. Also, find the maximum profit.
3. i) Integrate; $\int \frac{1}{x(1+l\quad)} dx$.

   ii) Solve the differential equation $x(x-y)dy + y^2 dx = 0$.

   OR

   Solve by inverse matrix method; $x + y - 2z = 0, x - y + z = 1; x + y + z = 3$.

Group B

Short Answer Questions (Attempt any five) [5 x 4 =20]

4. Find square roots of the complex number $2 - i2\sqrt{3}$, by using De-Moivre's theorem.
5. A function defined by $f(x) = \begin{cases} 3x+2 & for -2 \le x < 0 \\ 2-5x & for\ 0 \le x < 2 \\ 5-2x & for\ x \ge 2 \end{cases}$

   Show that $f(x)$ is continuous at $x = 0$ and discontinuous at $x = 2$.
6. Find the intervals in which the curve $f(x) = x^3 - 4x^2 - 3x + 2$, increasing or decreasing.
7. The demand and supply function for a goods are $P = 100 - 0.5Q$ and $P = 10 + 0.5Q$ respectively.

   i) Calculate the equilibrium price and supply.

   ii) Calculate consumers and production surplus at equilibrium condition.
8. Show that $5\vec{\imath} + 6\vec{\jmath} + 7\vec{k}$, $7\vec{\imath} - 8\vec{\jmath} + 9\vec{k}$ and $3\vec{\imath} + 20\vec{\jmath} + 5\vec{k}$ are linearly dependent.
9. Prove that; $\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix} = (x-y)(y-z)(z-x)$.

Group C

Very Short Answer Question (Attempt All) [2x4x2 =16]

10. a. Write the conjugate of complex number $\frac{1}{(2-3i)^2}$.

    b. If fixed cost of 20 articles is Rs.500 and variable cost for each article is 40. Find the total cost function? Also, find the total cost of 90 articles.
11. .a. Evaluate; $\lim_{x\to 0} \frac{\sqrt{3a-x}-\sqrt{x+a}}{4(x-a)}$.

    b. Find derivative of $x^3 + y^3 = 3axy$
12. .a. Evaluate; $\int \frac{x+3}{\sqrt{x+2}} dx$.

    b. If $\vec{a} = (5,2)\ and\ \vec{b} = (-3,4)$. find unit vector of $3\vec{a} - 5\vec{b}$.
13. a. Find the vector perpendicular to each of the vectors $\vec{a} = (2,2,-1) and\ \vec{b} = (6,3,2)$.

    b. Find the value of x and y when $\begin{bmatrix} x & 1 \\ 2 & y \end{bmatrix}\begin{bmatrix} 1 & 3 \\ 2 & 6 \end{bmatrix} = \begin{bmatrix} 1 & 3 \\ 6 & 18 \end{bmatrix}$.

THE END