

19. From the following data obtain the two regression equations. Also estimate the value of

(a) x when $y = 25$ and

(b) y when $x = 30$.

X: 25 28 30 32 35 36 38 39 42 45

Y: 20 26 29 30 25 18 26 35 35 46

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MATHEMATICS

Time : Three hours

Maximum : 100 marks

PART A — (6 × 5 = 30 marks)

Answer any SIX questions.

1. If $x = a(t + \sin t)$, $y = a(1 - \cos t)$ find $\frac{dy}{dx}$.
2. Prove that if $y = \sin(m \sin^{-1} x)$ then $(1 - x^2)y'' - xy' + m^2y = 0$.
3. Evaluate $\int \frac{xdx}{1+x^4}$.
4. Evaluate $\int \sin^{-1} x dx$.
5. Find the unit vector perpendicular to each of the vector $2\vec{i} + \vec{j} - \vec{k}$ and $\vec{i} - 2\vec{j} + \vec{k}$.
6. Find the inverse of the matrix $\begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$.

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7. Find the angle between the pair of straight lines $ax^2 + 2hxy + by^2 = 0$.
8. Find the equation of the circle which touches the axes and whose centre lies on the line $x - 2y = 3$.
9. Find the mean, median and mode for the following data 18, 15, 18, 16, 17, 18, 15, 19, 17, 17.
10. Eight coins are thrown simultaneously. Find the probability of getting atleast six heads.

PART B — (4 × 10 = 40 marks)

Answer any FOUR questions.

11. Differentiate :
 - (a) $xe^x \sin x$
 - (b) $\log(\log(\log x))$
12. Evaluate :
 - (a) $\frac{dx}{x^2 - 6x + 5}$
 - (b) $\int \sin^{-1} x dx$
13. Show that the system of equations $x + 2y + z = 11$, $4x + 6y + 5z = 8$, $2x + 2y + 3z = 19$ inconsistent.

14. Prove that the equation $12x^2 + 7xy - 10y^2 + 13x + 45y - 35 = 0$ represent a pair of straight lines and find the angle between them.

15. The data showing the test scores made by 10 salesman on an intelligence test and their weekly sales are recorded in the following table.

Salesman :	1	2	3	4	5	6	7	8	9	10
Test scores :	50	70	50	60	80	50	90	50	60	60
Sales ('000 Rs.)	25	60	45	50	45	20	55	30	45	30

Calculate the rank correlation coefficient between intelligence and efficiency in salesmanship.

16. Fit a Poisson distribution for the following data :

X :	0	1	2	3	4
F :	123	59	14	3	1

PART C — (2 × 15 = 30 marks)

Answer any TWO questions.

17. Evaluate : $I = \int_0^{\pi/2} \log \sin x dx$.
18. (a) Prove that $x^2 + 9y^2 + 6xy + 4x + 12y - 5 = 0$ represents two parallel straight lines.
 (b) Show that the straight line $x + y = 2 + \sqrt{2}$ touches the circle $x^2 + y^2 - 2x - 2y + 1 = 0$ and find the point of contact.

PROGRAMMING IN C

Time : Three hours

Maximum : 100 marks

PART A — (6 × 5 = 30 marks)

Answer any SIX questions.

1. What is initialization? Why is it important?
2. What are the different types of storage classes and for what purpose it is used?
3. Explain how a function is designed and what is the need for using function.
4. Write a simple C program using numeric function.
5. Write about the classification of pointers.
6. Write a simple C program to read a line of text.
7. Explain union give an example.
8. Write a simple C program to illustrate a structure.
9. How does an append mode differ from a write mode?
10. What is the significance of EOF?

