

- N.B. 1) Attempt any two questions from Section - I**
2) Attempt any two questions from Section - II
3) Bracketed figures to the right indicate marks.
4) Graph papers will be provided on request.

Section - I

Q.1 a) Find $\frac{dy}{dx}$ for the following : (Any three)

- i) $y = 7x^4 + \log_e x + 5^x$
- ii) $y = (3x^2 + x + 9) (2e^x + 4)$
- iii) $y = \frac{x^3 + 5e^x}{2 + 3x}$
- iv) $y = (x^2 + 2) (4x^3 + 5) (e^x + 7)$
- v) $y = \frac{(x^3 - 9)}{(e^x + 5)}$

6

Q.1 b) 1) Give the formats with one illustration for the following BASIC statements.

- i) REM
- ii) PRINT

2

2) Differentiate between string and numeric variables give examples of each.

2

Q.2 a) Write statements in BASIC for the following :-

- i) Add the square of x to the variable y and assign it to variable z.
- ii) To display the value of variables M, N & O.
- iii) End the program at line number 100.
- iv) To transfer the control to line no. 80 if $x \leq 25$
- v) Input age and pension of a person with a prompt.

5

b) 1) Find the equations of the tangent and the normal to the curve $y = x^2 - 4x + 5$ at $x = 1$.

5

Q.3 a) State whether the following statements are true or false.

- i) AND is a relational operator
- ii) STOP statement temporarily halts the execution of a program
- iii) 30 GOTO 30 is a correct statement.
- iv) 20 A = B \$ + C is a correct statement.
- v) 90 READ X; B; C; D is a valid statement.

5

- Q.3 b)** The total cost function is $c = 200 - 5x + x^2$ where x is the number of units produced. The demand function is $p = 200 - 4x$ where p is the price and x is the demand. Find x for which total cost is decreasing. Also find x , for which total revenue is increasing. 5

- Q.4 a) 1)** Write BASIC expression for the following :-

i)
$$\frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

ii)
$$|15A - 4BC| + \frac{(5x + 1)}{2x + 5}$$
 2

- 2) Find the value of the following BASIC expressions.

i) $ABS(8/10 * 5 - (5 + 6) / INT(4/3) * 14 / (4 + 3))$

ii) $INT(SQR(625) / 25) - 2 * (12 / 4)$

iii) Given $x = 3, y = 4, z = 1.2$

$(x - 3 * 4 + 10 * z) / y^{(1/2)} - 7$ 3

- Q.4 b)** Find x , for which the total cost function 'c' is minimum, where $C = x^3 - 24x^2 + 189x + 20$. Also find the minimum cost. 5

Section - II

- Q.5 a)** Define correlation. Describe the method of scattered diagram to determine correlation. 4

- b) Calculate Karl Pearson's coefficient of correlation for the following data on price and demand of a certain commodity.

Price (in Rs.)	:	21	22	23	24	25	26	27	30
Demand (in '000 units)	:	18	19	19	16	17	16	15	11

- c) Two regression equations are given as below.

$3x + 2y - 26 = 0$ & $6x + y - 31 = 0$.

Find i) mean values of x and y .

ii) Correlation coefficient between x & y .

iii) SD of y when SD of x is 4.

iv) the most probable value of y when $x = 5$ 6

- Q.6 a)** What is a time series? Describe the various components of a time series. 5

- b) Fit a straight line trend equation by the method of least squares. Also estimate the production for the year 2001. 5

Year	:	1994	1995	1996	1997	1998	1999	2000
Production								
(in '000 tonnes)	:	18	21	23	27	24	22	16.

- c) A bag contains 35 balls marked 1 to 35. One ball is drawn at random. What is the probability that the ball is marked with a number which is

- i) a perfect square
- ii) even number
- iii) multiple of 5 or 7

5

- Q.7 a) 1) Explain the following terms with suitable examples.

- i) Random Experiment.
- ii) an event.
- iii) probability of an event

3

- 2) State addition theorem of probability

2

- Q.7 b) For the following distribution of x.

x	:	0	1	2	3	4	5	6
p(x)	:	0.02	0.06	0.10	0.14	0.18	0.22	0.28.

Find (i) $P(x \leq 4)$ (ii) $P(x \text{ is a multiple of } 3)$

- iii) Expected value of x.
- iv) Variance of x.

5

- c) Define Binomial distribution.

Assume the probability that a bomb dropped from an aeroplane will strike a target is $\frac{1}{5}$. If 6 bombs are dropped.

Find the probability that (i) exactly two will strike the target.

- ii) None of them will strike the target.

5

- Q.8 a) Explain census method & sampling method of data collection.

Distinguish between them.

5

- b) In a certain examination mean of marks scored by 400 students is 45 with a standard deviation of 15. Assuming the distribution to be normal,

Find i) the number of students securing marks between 30 and 60.

- ii) number of students that scored more than 60.

(Given : Area under standard normal curve between $z = 0$ and $z = 1$ is 0.3413)

5

Q.8 c) Calculate spearman's rank correlation coefficient for the following data of scores in psychological test (x) and arithmetic ability (y) of 10 children.

Child	x	y
A	95	99
B	96	100
C	98	97
D	100	99
E	97	96
F	98	94
G	90	92
H	93	91
I	92	93
J	99	95
