(8) The order and degree of the differential equation are $\frac{d^2y}{dx^2} + x = \sqrt{y + \frac{dy}{dx}}$

(1) 2, 1 (2) 1, 2 (3) 2, $\frac{1}{2}$ (4) 2, 2

(9) The order and degree of the differential equation are $\frac{d^2y}{dx^2} - y + \left(\frac{dy}{dx} + \frac{d^3y}{dx^3}\right)^{\frac{3}{2}} = 0$

(1) 2, 3 (2) 3, 3 (3) 3, 2 (4) 2, 2

(10) The order and degree of the differential equation are $y'' = (y - y'^3)^{\frac{2}{3}}$

(1) 2, 3 (2) 3, 3 (3) 3, 2 (4) 2, 2

(11) The order and degree of the differential equation are $y' + (y'')^2 = (x + y'')^2$

(1) 1, 1 (2) 1, 2 (3) 2, 1 (4) 2, 2

(12) The order and degree of the differential equation are $y' + (y'')^2 = x(x + y'')^2$

(1) 2, 2 (2) 2, 1 (3) 1, 2 (4) 1, 1

(13) The order and degree of the differential equation are $\left(\frac{dy}{dx}\right)^2 + x = \frac{dx}{dy} + x^2$

(1) 2, 2 (2) 2, 1 (3) 1, 2 (4) 1, 3

(14) The order and degree of the differential are $\sin x\,(dx + dy) = \cos x\,(dx - dy)$

(1) 1, 1 (2) 0, 0 (3) 1, 2 (4) 2, 1

(15) The differential equation corresponding to $xy = c^2$ where c is an arbitrary constant, is

(1) $xy'' + x = 0$ (2) $y'' = 0$ (3) $xy' + y = 0$ (4) $xy'' - x = 0$

(16) In finding the differential equation corresponding to $y = e^{mx}$ where m is the arbitrary constant, then m is

(1) $\frac{y}{y'}$ (2) $\frac{y'}{y}$ (3) y' (4) y

(17) The solution of a linear differential equation $\frac{dx}{dy} + Px = Q$ where P and Q are functions of y, is

(1) $y(I.F) = \int (I.F.)\, Q\, dx + c$ (2) $x(I.F) = \int (I.F.)\, Q\, dy + c$

(3) $y\,(I.F.) = \int (I.F.)\, Q\, dy + c$ (4) $x(I.F.) = \int (I.F.)\, Q\, dx + c$

(18) The solution of the linear differential equation $\frac{dy}{dx} + Py = Q$ where P and Q are functions of x is

(1) $y(I.F) = \int (I.F.)\, Q\, dx + c$ (2) $x(I.F) = \int (I.F.)\, Q\, dy + c$

(3) $y\,(I.F.) = \int (I.F.)\, Q\, dy + c$ (4) $x(I.F.) = \int (I.F.)\, Q\, dx + c$

(19) Identify the incorrect statement.

(1) The order of a differential equation is the order of the highest order derivative occuring in it

(2) The degree of the differential equation is the degree of the highest order derivative which occurs in it (the derivatives are free from radicals and fractions)

(3) $\frac{dy}{dx} = \frac{f_1(x, y)}{f_2(x, y)}$ is the first order first degree homogeneous differential equation

(4) $\frac{dy}{dx} + xy = e^x$ is a linear differential equation in x

CHAPTER IX

(1) Which of the following are statements ?

(i) Chennai is the capital of Tamilnadu.

(ii) The earth is a planet.

(iii) Rose is a flower.

(iv) Every triangle is an isosceles triangle.

(1) all (2) (i) and (ii) (3) (ii) and (iii) (4) (iv) only

(2) Which of the following are not statements ?

(i) Three plus four is eight (ii) The sun is a planet.

(iii) Switch on the light. (iv) Where are you going?

(1) (i), (ii) (2) (ii), (iii) (3) (iii) and (iv) (4) (iv) only

(3) The truth values of the following statements are

(i) Ooty is in Tamilnadu and 3 + 4 = 8

(ii) Ooty is in Tamilnadu and 3 + 4 = 7

(iii) Ooty is in Kerala and 3 + 4 = 7

(iv) Ooty is in Kerala and 3 + 4 = 8

(1) F T F F (2) F F F T (3) T T F F (4) T F T F

(4) The truth values of the following statements are

(i) Chennai is in India or $\sqrt{2}$ is an integer.

(ii) Chennai is in India or $\sqrt{2}$ is an irrational number.

(iii) Chennai is in China or $\sqrt{2}$ is an integer.

(iv) Chennai is in China or $\sqrt{2}$ is an irrational number.

(1) T F T F (2) T F F T (3) F T F T (4) T T F T

(5) Which of the following are not statements ?

(i) All natural numbers are integers.

(ii) A square has five sides.

(iii) The sky is blue.

(iv) How are you?

(1) (iv) only (2) (i) and (iv) (3) (i), (ii), (iii) (4) (iii) and (iv)

(6) Which of the following are statements?

(i) $7 + 2 < 10$.

(ii) The set of rational numbers is finite.

(iii) How beautiful you are!

(iv) Wish you all success.

(1) (iii) (iv) (2) (i), (ii) (3) (i), (iii) (4) (ii), (iv)

(7) The truth values of the following statements are

(i) All the sides of a rhombus are equal in length.

(ii) $1 + \sqrt{19}$ is an irrational number.

(iii) Milk is white.

(iv) The number 30 has four prime factors.

(1) TTTF (2) TTTT (3) TFTF (4) FTTT

(8) The truth values of the following statements are

(i) Paris is in France.

(ii) Sin x is an even function.

ii) Every square matrix is non-singular.

iv) Jupiter is a planet.

(1) TFFT (2) FTFT (3) FTTF (4) FFTT

(9) Let p be "Kamala is going to school" and q be "There are twenty students in the class". "Kamala is not going to school or there are twenty students in the class" stands for

(1) $p \vee q$ (2) $p \wedge q$ (3) $\sim p$ (4) $\sim p \vee q$

(10) If p stands for the statement "Sita likes reading" and q for the statement "Sita likes playing'. "Sita likes neither reading nor playing" stands for

(1) $\sim p \wedge \sim q$ (2) $p \wedge \sim q$ (3) $\sim p \wedge q$ (4) $p \wedge q$

(11) If p is true and q is unknown then

(1) $\sim p$ is true (2) $p \vee (\sim p)$ is false

(3) $p \wedge (\sim p)$ is true (4) $p \vee q$ is true

(12) If p is true and q is false then which of the following is not true?

(1) $p \rightarrow q$ is false (2) $p \vee q$ is true

(3) $p \wedge q$ is false (4) $p \leftrightarrow q$ is true

(13) Which of the following is not true?

(1) Negation of a negation of a statement is the statement itself

(2) If the last column of its truth table contains only T then it is tautology

(3) If the last column of its truth table contains only F then it is contradiction

(4) If p and q are any two statements then $p \leftrightarrow q$ is a tautology

(14) Which of the following are binary operation on R?

(a) $a * b = \min\{a, b\}$ (b) $a * b = \max\{a, b\}$

(c) $a * b = a$ (d) $a * b = b$

(1) all (2) (a), (b) and (c)

(3) (b), (c) and (d) (4) (c), (d)

(15) '+' is not a binary operation on

(1) N (2) Z (3) C (4) $Q - \{0\}$

(16) '–' is a binary operation on

(1) N (2) $Q - \{0\}$ (3) $R - \{0\}$ (4) Z

(17) '÷' is a binary operation on

(1) N (2) R (3) Z (4) $C - \{0\}$

(18) In congruence modulo 5, $\{x \in z / x = 5k + 2, k \in z\}$ represents

(1) [0] (2) [5] (3) [7] (4) [2]

(19) $[5].{}_{12}[11]$ is

(1) [55] (2) [12] (3) [7] (4) [11]

(20) $[3] +_8 [7]$ is

(1) [10] (2) [8] (3) [5] (4) [2]

(21) In the group $(G,.)$, $G = \{1, -1, i, -i\}$, order of -1 is

(1) -1 (2) 1 (3) 2 (4) 0

(22) In the group $(G, .)$, $G = \{1, -1, i, -i\}$, order of $-i$ is

(1) 2 (2) 0 (3) 4 (4) 3

(23) In the group $(G, .)$ $G = \{1, \omega, \omega^2\}$, ω is cube root of unity, $0(\omega^2)$ is

(1) 2 (2) 1 (3) 4 (4) 3

(24) In the group $(Z_4, +_4)$, order of [0] is

(1) 1 (2) ∞ (3) can't be determined (4) 0

(25) In the group $(Z_4, +_4)$, $0([3])$ is

(1) 4 (2) 3 (3) 2 (4) 1

(26) In (S, o), $xoy = x$, $x, y \in s$ then 'o' is

(1) only associative (2) only commutative

(3) associative and commutative (4) neither associative nor commutativ

(27) In $(N, *)$, $x * y = \max\{x, y\}$, $x, y \in N$ then $(N, *)$ is

(1) only closed (2) only semi group (3) only monoid (4) a grou

(28) The set of positive even integers, with usual multiplication forms

(1) a finite group (2) only a semi group

(3) only a monoid (4) an infinite group

(29) The set of positive even inte ith usual addition forms

(1) a finite group (2) only a semi group

(3) only a monoid (4) an infinite group

(30) In the group $(Z_5 - \{[0]\}, .5)$, $0([3])$ is

(1) 5 (2) 3 (3) 4 (3) 2

(31) In the group $(G, .)$, $G = \{1, -1, i, -i\}$ the order of 1 is

(1) 2 (2) 0 (3) 4 (4) 1

(32) In the group $(G, .)$, $G = \{1, -1, i, -i\}$ the order of of i is

(1) 2 (2) 0 (3) 4 (4) 3

(33) In the group $(G, .)$ $G = \{1, \omega, \omega^2\}$, ω is cube root of unity then $0(\omega)$ is

(1) 2 (2) 1 (3) 4 (4) 3

(34) In the group $(G, .)$ $G = \{1, \omega, \omega^2\}$, ω is cube root of unity then $0(1)$ is

(1) 2 (2) 1 (3) 4 (4) 3

(35) In the group $(Z_4, +_4)$, order of $0([1])$ is

(1) 1 (2) ∞ (3) can't be determined (4) 4

(36) In the group $(Z_4, +_4)$, order of $0([2])$ is

(1) 1 (2) 2 (3) can't be determined (4) 0

(37) In the group $(Z_5 - \{[0]\}, .5)$, $0([2])$ is

(1) 5 (2) 3 (3) 4 (3) 2

(38) In the group $(Z_5 - \{[0]\}, .5)$, $0([4])$ is

(1) 5 (2) 3 (3) 4 (3) 2

(39) In the group $(Z_5 - \{[0]\}, .5)$, $0([1])$ is

(1) 1 (2) 2 (3) 3 (4) 4

CHAPTER X

(1) A discrete random variable takes

(1) only a finite number of values

(2) all possible values between certain given limits

(3) infinite number of values

(4) a finite or countable number of values

(2) A continuous random variable takes

(1) only a finite number of values

(2) all possible values between certain given limits

(3) infinite number of values

(4) a finite or countable number of values

(3) If X is a discrete random variable then $P(X \geq a) =$

(1) $P(X < a)$ (2) $1 - P(X \leq a)$ (3) $1 - P(X < a)$ (4) 0

(4) If X is a continuous random variable then $P(X \geq a) =$

(1) $P(X < a)$ (2) $1 - P(X > a)$ (3) $P(X > a)$ (4) $1 - P(x \leq a - 1)$

(5) If X is a continuous random variable then $P(a < X < b) =$

(1) $P(a \leq X \leq b)$ (2) $P(a < X \leq b)$ (3) $P(a \leq X < b)$ (4) all the three above

(6) A continuous random variable X has p.d.f. $f(x)$, then

(1) $0 \le f(x) \le 1$ (2) $f(x) \ge 0$ (3) $f(x) \le 1$ (4) $0 < f(x) < 1$

(7) A discrete random variable X has probability, mass function $p(x)$, then

(1) $0 \le p(x) \le 1$ (2) $p(x) \ge 0$ (3) $p(x) \le 1$ (4) $0 < p(x) < 1$

(8) Mean and variance of binomial distribution are

(1) nq, npq (2) np, $\sqrt{npq}$ (3) np, np (4) np, npq

(9) Which of the following is or are correct regarding normal distribution curve?

(a) Symmetrical about the line $X = \mu$ (mean)

(b) Mean = median = mode

(c) Unimodal

(d) Points of inflection are at $X = \mu \pm \sigma$

(1) (a), (b) only (2) (b), (d) only (3) (a), (b), (c) only (4) all

(10) For a standard normal distribution the mean and variance are

(1) μ, σ^2 (2) μ, σ (3) 0, 1 (4) 1, 1

(11) The *p.d.f.* of the standard normal variate Z is $\varphi(z) =$

(1) $\frac{1}{\sqrt{2\pi}\,\sigma} e^{-\frac{1}{2}z^2}$ (2) $\frac{1}{\sqrt{2\pi}} e^{-z^2}$ (3) $\frac{1}{\sqrt{2\pi}} e^{\frac{1}{2}z^2}$ (4) $\frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}z^2}$

(12) If X is a discrete random variable then which of the following is correct?

(1) $0 \le F(x) < 1$ (2) $F(-\infty) = 0$ and $F(\infty) \le 1$

(3) $P[X = x_n] = F(x_n) - F(x_{n-1})$ (4) $F(x)$ is a constant function

(13) If X is a continuous random variable then which of the following is incorrect?

(1) $F'(x) = f(x)$ (2) $F(\infty) = 1$; $F(-\infty) = 0$

(3) $P[a \le x \le b] = F(b) - F(a)$ (4) $P[a \le x < b] \ne F(b) - F(a)$

(14) Which of the following are correct?

(i) $E(aX + b) = aE(X) + b$ (ii) $\mu_2 = \mu_2' - (\mu_1')^2$

(iii) μ_2 = variance (iv) var $(aX + b) = a^2$ var(X)

(1) all (2) (i), (ii), (iii) (3) (ii), (iii) (4) (i), (iv)

(15) Which of the following is not true regarding the normal distribution?

(1) skewness is zero

(2) mean = median = mode

(3) the points of inflection are at $X = \mu \pm \sigma$

(4) maximum height of the curve is $\frac{1}{\sqrt{2\pi}}$.