

GENERAL INSTRUCTIONS :-

1. All questions are compulsory.
2. SECTION – A comprises of 4 questions of one marks each.
3. SECTION – B comprises of 8 questions of two marks each.
4. SECTION – C comprises of 11 questions of four marks each.
5. SECTION – D comprises of 6 questions of six marks each.
6. Internal choice has been provided in 03 questions of four marks each and 02 questions of six marks each. You have to attempt only one of the alternatives in all such questions.

SECTION – A

- Q. 1. Evaluate : $\tan\left(\frac{13\pi}{12}\right)$
- Q. 2. Give example of sets A, B and C such that $A \cap B, B \cap C$ & $A \cap C \neq \phi$ but $A \cap B \cap C = \phi$.
- Q. 3. Find the value of k so that the lines $3x + y = 2, kx + 2y = 3$ & $2x - y = 3$ may be concurrent.
- Q. 4. A coin is tossed twice, what is the probability that at least one tail occurs?

SECTION – B

- Q. 5. Find the 4th term from end in the expansion of $(2a - 3b)^{12}$.
- Q. 6. Evaluate : $\lim_{x \rightarrow 1} [x - 1]$, where $[.]$ represents the greatest integer function.
- Q. 7. If A and B are two events such that $P(A) = 0.54, P(B) = 0.69$ & $P(A \cap B) = 0.35$. Find $P(A' \cap B')$
- Q. 8. If $y = x \cdot \sin x$, then show that $x \left(\frac{dy}{dx}\right) = y + x\sqrt{x^2 - y^2}$
- Q. 9. Find the equations of the lines, which cut-off intercepts on the axes whose sum and product are 1 and -6, respectively.
- Q. 10. Find the equation of the circle with radius 5 whose centre lies on x - axis and passes through the point (2, 3).
- Q. 11. Find the general solution of the equation, $2\cos^2 x + 3 \sin x = 0$
- Q. 12. Find the domain and the range of the real function f defined by $f(x) = \sqrt{x - 1}$

SECTION – C

- Q. 13. Evaluate : $\tan\left(\frac{\pi}{8}\right)$

OR

In triangle ABC prove that, $\tan\left(\frac{A - B}{2}\right) = \left(\frac{a - b}{a + b}\right) \cot\left(\frac{C}{2}\right)$

- Q. 14. Find n , if the ratio of the fifth term from the beginning to the fifth term from the end in the expansion of $\left(\sqrt[4]{2} + \frac{1}{\sqrt[4]{3}}\right)^n$ is $\sqrt{6} : 1$.

OR

If the coefficients of a^{r-1}, a^r and a^{r+1} in the expansion of $(1 + a)^n$ are in A.P, prove that $n^2 - n(4r + 1) + 4r^2 - 2 = 0$.

- Q. 15. Let R be a relation from N to N defined by $R = \{(a, b) : a, b \in N \text{ and } a = b^2\}$. Are the following true?
(i) $(a, a) \in R$, for all $a \in N$ (ii) $(a, b) \in R$, implies $(b, a) \in R$ (iii) $(a, b) \in R, (b, c) \in R$ implies $(a, c) \in R$.
- Q. 16. In a class of 60 students, 30 opted for NCC , 32 opted for NSS and 24 opted for both NCC and NSS . If one of these students is selected at random, find the probability that the student has opted
(i) neither NCC nor NSS . (ii) NSS but not NCC .
- Q. 17. If A, B & C are any three events associated with any random experiment, then prove that,
 $P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(C \cap A) + P(A \cap B \cap C)$.

Q. 18. Find the lengths of the medians of the triangle with vertices $A(0, 0, 6), B(0, 4, 0)$ & $C(6, 0, 0)$

Q. 19. Find the range of the function $f = \left\{ \left(x, \frac{x^2}{x^2 + 1} \right) : x \in \text{Real} \right\}$

Q. 20. In the triangle ABC with vertices $A(2, 3), B(4, -1)$ & $C(1, 2)$, find the equation and length of altitude from the vertex A .

Q. 21. Find the value of a and b for the function $f(x) = \begin{cases} a + bx & ; x < 1 \\ 4 & ; x = 1 \\ b - ax & ; x > 1 \end{cases}$, if $\lim_{x \rightarrow 1} f(x) = f(1)$

OR

Evaluate : $\lim_{x \rightarrow 1} \left\{ \frac{x^4 - 81}{2x^2 - 5x - 3} \right\}$

Q. 22. Find the equation of ellipse having foci on $(\pm 4, 0)$ and vertices $(\pm 5, 0)$

Q. 23. In a survey it was found that 21 people liked product A , 26 liked product B and 29 liked product C . If 14 people liked products A and B , 12 people liked products C and A , 14 people liked products B and C and 8 liked all the three products. Find how many liked (i) exactly one product (ii) exactly two products.

SECTION - D

Q. 24. If $\lim_{x \rightarrow a} f(x)$ exists, for the function $f(x) = \begin{cases} |x| + 1 & ; x < 0 \\ 0 & ; x = 0 \\ |x| - 1 & ; x > 0 \end{cases}$, find the value of a .

Q. 25. Find $\frac{dy}{dx}$, if (i) $y = \sin^n x$ (ii) $y = \frac{x \cos x}{x - \tan x}$

OR

Using delta process, find the derivative of the function $f(x) = \tan x$

Q. 26. Find the distance of the line $4x - y = 0$ from the point $P(4, 1)$ measured along the line making an angle of 135° with the positive x -axis.

Q. 27. The coefficients of three consecutive terms in the expansion of $(1 + a)^n$ are in the ratio 1 : 7 : 42. Find n .

Q. 28. Find the equation of the circle passing through the points $(2, 3)$ and $(-1, 1)$ and whose centre is on the line $x - 3y = 11$.

OR

Find the equation of the ellipse if centre at $(0, 0)$, major axis on the y -axis and passes through the points $(3, 2)$ and $(1, 6)$.

Q. 29. Solve the system of inequalities graphically: $2x + y \geq 4, x + y \leq 3, 2x - 3y \leq 6, x \geq 0, y \geq 0$
