

6 – Marks

- Q. 1. If a and b are the roots of $x^2 - 3x + p = 0$ and c, d are roots of $x^2 - 12x + q = 0$, where a, b, c, d form G.P. Prove that $(q + p) : (q - p) = 17:15$.
- Q. 2. Find the direction in which a line must be drawn through the point $(-1, 2)$ so that its point of intersection with the line $x + y = 4$ may be at a distance **3 units** from this point .
- Q. 3. Find the centre, the lengths of axes, eccentricity, foci of the hyperbola: $x^2 - 2y^2 - 2x + 8y - 1 = 0$.
- Q. 4. Find the derivative of the function $f(x) = x \sec x$, using first principle.
- Q. 5. The mean and standard deviation of a group of **100** observations were found to be **20** and **3**, respectively. Later on it was found that three observations were incorrect, which were recorded as **21, 21** and **18**. Find the mean and standard deviation if the incorrect observations are omitted.
- Q. 6. If **4**-digit numbers greater than or equals to **5,000** are randomly formed from the digits **0, 1, 3, 5, and 7**, what is the probability of forming a number divisible by **5** when,
(i) The digits are repeated ? (ii) the repetition of digits is not allowed ?

4 – Marks

- Q. 7. If p, q, r are in G.P. and the equations, $px^2 + 2qx + r = 0$ and $dx^2 + 2ex + f = 0$ have a common root, then show that $\frac{d}{p}, \frac{e}{q}, \frac{f}{r}$ are in A.P
- Q. 8. If the first and the n^{th} term of a G.P. are ' a ' and ' b ', respectively, and if ' P ' is the product of n terms, prove that ; $P^2 = (ab)^n$.
- Q. 9. Prove that the product of the lengths of the perpendiculars drawn from the points $(\sqrt{a^2 - b^2}, 0)$ and $(-\sqrt{a^2 - b^2}, 0)$ to the line $\frac{x \cos \phi}{a} + \frac{y \sin \phi}{b} = 1$ is b^2 .
- Q. 10. A ray of light passing through the point $(1, 2)$ reflects on the x – axis at the point A and the reflected ray passes through point $(5, 3)$, then find the coordinate of the point A.
- Q. 11. Find the equation of the ellipse, such that major axis is x – axis, centre is at origin and the ellipse passes through $(4, 3)$ and $(6, 2)$.
- Q. 12. Find the equation of the circle whose centre is $(3, -1)$ and which cut off an intercept of length **6** from the line $2x - 5y + 18 = 0$.
- Q. 13. Find the image of the point $A(2, -3, 5)$ in the mirror (i) YZ – plane (ii) y – axis
- Q. 14. Find the coordinates of the point where the line through $(3, -4, -5)$ and $(2, -3, 1)$ crosses the plane $2x + y + z = 7$.
- Q. 15. A point R with x -coordinate **4** lies on the line segment joining the points $P(2, -3, 4)$ and $Q(8, 0, 10)$. Find the coordinates of the point R .

Q. 16. Find the derivative of the following functions: (i) $\frac{\sin x + \cos x}{\sin x - \cos x}$ (ii) $\frac{x \cos x}{x - \tan x}$

Q. 17. Find : $\lim_{x \rightarrow 0} \left\{ \frac{\tan x - \sin x}{x^3} \right\}$

Q. 18. If, $f(x) = \begin{cases} |x| + 1, & x < 0 \\ 0, & x = 0 \\ |x| - 1, & x > 0 \end{cases}$ For what value(s) of a does $\lim_{x \rightarrow a} f(x)$ exists?

Q. 19. Out of 100 students, two sections of 40 and 60 are formed. If you and your friend are among 100 students, What is the probability that, (i) you both enter the same section ?
(ii) you both enter the different section ?

Q. 20. 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
(i) The student has opted neither NCC nor NSS.
(ii) The student has opted NSS but not NCC.

Q. 21. Find mean deviation about the mean for the following data:

x_i	2	5	6	8	10	12
f_i	2	8	10	7	8	5

Q. 22. Calculate the mean deviation about median age for the age distribution of 100 persons given below:

Age	16 – 20	21 – 25	26 – 30	31 – 35	36 – 40	41 – 45	46 – 50	51 – 55
Number	5	6	12	14	26	12	16	9
