TEST PAPER – 1 (St. Xavier's)
Mathematics – XI

Time : 3 hr | Max Marks : 100

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. If $A = \{1, 2\}, B = \{3, 4\}$ and $C = \{-1, -3\}$ find $A \times B \times C$.

Q. 2. If $y = log\ (cos(e^{-x}))$, find $\frac{dy}{dx}$

Q. 3. Evaluate: $cosec\left(-\frac{19\pi}{6}\right)$

Q. 4. Find the equation of the set of points which are equidistant from the points $(1, 2, 3)$ and $(3, 2, -1)$.

SECTION – B

Q. 5. Find the range of μ for which the expression $x^2 + y^2 + 6x + 8y + \mu = 0$ represents a circle.

Q. 6. A speaks truth in 70% of the cases and B in 80% of the cases. In what percentage of the cases are they likely to contradict each other in stating the same fact ?

Q. 7. Let U be the set of all boys and girls in a school, G be the set of all girls in the school, B be the set of all boys in the school, and S be the set of all students in the school who take swimming. Some, but not all, students in the school take swimming.
Draw a Venn diagram showing one of the possible inter relationship among sets U, G, B and S.

Q. 8. Let $f, g : R \to R$ be defined, respectively by $f(x) = x + 1, g(x) = 2x - 3$. Find $\left(\frac{f}{g}\right)(x)$

Q. 9. Evaluate: $\lim_{x \to 0}\left\{\frac{x(e^x - 1)}{1 - cos\, x}\right\}$

Q. 10. If, $sin^2 y + cos\, xy = k$, find $\frac{dy}{dx}$

Q. 11. Show that : $sin\, 2x + 2\, sin\, 4x + sin\, 6x = 4\, cos^2 x . sin\, 4x$

Q. 12. Find the path (equation) of a moving point such that its distances from two lines $3x - 2y = 5$ and $3x + 2y = 5$ are equal.

SECTION – C

Q. 13. Find $\lim_{x \to 0} f(x)$ for the function $f(x) = \begin{cases} \frac{|x|}{x} & ; x \neq 0 \\ 0 & ; x = 0 \end{cases}$

OR

Find $\frac{dy}{dx}$ if $(i)\ y = \frac{x}{sin^n x}$ $(ii)\ y = \frac{sin x + cos x}{sin x - cos x}$

Q. 14. On her vacations Veena visits four cities A, B, C & D in a random order. What is the probability that she visits (i) A before B? (ii) A just before B?

OR

A fair coin is tossed 4 times. A person win Re1, for each head and lose Rs1.50 for each tail that turns up. From the sample space & calculate how many different amount of money the person can have after 4 tosses also calculate the probability of having each of these amount

Q. 15. Find the points at which the line segment joining the points $(4, 8, 10)$ and $(6, 10, -8)$ is trisected.

Q. 16. Find the equation of the circle passing through origin and making intercepts a & b on coordinate axes.

Q. 15. Three letters are dictated to three persons and an envelope is addressed to each of them, if the letters are inserted into the envelopes at random so that each envelope contains exactly one letter. Find the probability that at least one letter is in its proper envelope.

Q. 18. Find the domain and range of the function $f(x) = \begin{cases} 1-x\,;\ x<0 \\ 1\quad\ ;\ x=0 \\ 1+x\,;\ x>0 \end{cases}$, also plot the graph of the function.

Q. 19. Let f be any function defined as $f(x) = \sqrt{9-x^2}$, find domain and range of the function.

Q. 20. A college awarded 38 medals in football, 15 in basketball and 20 in cricket. If these medals went to a total of 58 men and only three men got medals in all the three sports, how many received medals in exactly two of the three sports?

Q. 21. Prove that: $cot\,x.cot\,2x - cot\,2x.cot\,3x - cot\,3x.cot\,x = 1$

OR

Prove that : $\cos 2x.\cos\left(\frac{x}{2}\right) - \cos 3x.\cos\left(\frac{9x}{2}\right) = \sin 5x.\sin\left(\frac{5x}{2}\right)$

Q. 22. Find the equation of the line passing through the point of intersection of the lines $4x + 7y = 3$ and $2x - 3y + 1 = 0$ that has equal intercepts on the axes.

Q. 23. The sum of the coefficients of the first three terms in the expansion of $\left(x - \frac{3}{x^2}\right)^m$, $x \neq 0, m \in N$, is 559. Find the term of the expansion containing x^3.

SECTION – D

Q. 24. Find the equation of the hyperbola having foci on $(0, \pm\sqrt{10})$ and which passes through $(2,3)$.

OR

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. 25. A line is such that its segment between the lines $5x - y + 4 = 0$ and $3x + 4y = 4$ is bisected at the point $(1,5)$. Obtain its equation.

OR

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. 26. Find a, b and n in the expansion of $(a+b)^n$ if the first three terms of the expansion are 729, 7290 and 30375 respectively.

Q. 27. Using *ab – initio*, find the differential coefficient of the function $f(x) = x\sin x$

Q. 28. If $\lim_{x\to a} f(x)$ exists, for the function $f(x) = \begin{cases} |x|+1\,;x<0 \\ 0\quad\ \ ;x=0 \\ |x|-1\,;x>0 \end{cases}$, find the value of a.

Q. 29. Solve the inequalities graphically: $x - 2y \leq 3, 3x + 4y \geq 12, x \geq 0, y \geq 1$

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