

TEST PAPER – 1 (Vivekanand School)

Mathematics – XI

Time : 3 hr

Max Marks : 90

GENERAL INSTRUCTIONS :-

1. All questions are compulsory.
2. SECTION – A comprises of 6 questions of one marks each.
3. SECTION – B comprises of 12 questions of four marks each.
4. SECTION – C comprises of 6 questions of six marks each.
5. Internal choice has been provided in 04 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. Find the degree measure of the angle – 4 radian.
- Q. 2. Find the 4th term from end in the expansion $(2a - 3x)^{12}$
- Q. 3. The perpendicular from the origin to a line meets it at the point $(-2, 9)$, find the equation of the line.
- Q. 4. If length of perpendicular from origin on a line is 2 unit and the perpendicular is making an angle 135° with x – axis. Find equation of the line.
- Q. 5. State the octant in which the point $A(1, -2, -3)$ lies.
- Q. 6. Find the coordinates of a point on y – axis which are at a distance of $5\sqrt{2}$ from the point $P(3, -2, 5)$.

SECTION – B

- Q. 7. 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. 8. Find the equation of the circle which passes through the point $(4, 1)$ and $(6, 5)$ and whose centre lies on the line $4x + y = 16$.

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. 9. Find the equation of the hyperbola having foci on $(0, \pm\sqrt{10})$ and which passes through $(2, 3)$.
- Q. 10. 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 $n^2 - n(4r + 1) + 4r^2 - 2 = 0$.

OR

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

- Q. 11. Prove that : $\cos^2 x + \cos^2 \left(x + \frac{\pi}{3}\right) + \cos^2 \left(x - \frac{\pi}{3}\right) = \frac{3}{2}$
- Q. 12. Prove that : $2 \cos\left(\frac{\pi}{13}\right) \cos\left(\frac{9\pi}{13}\right) + \cos\left(\frac{3\pi}{13}\right) + \cos\left(\frac{5\pi}{13}\right) = 0$

OR

Find the general solution of the equation ; $\tan 2x = -\cot \left(x + \frac{\pi}{3}\right)$

- Q. 13. Find the image of the point $(3, 8)$ with respect to the line $x + 3y = 7$, assuming the line to be a plane mirror.
- Q. 14. Using section formula, prove that the three points $A(-4, 6, 10)$, $B(2, 4, 6)$ and $C(14, 0, -2)$ are collinear. Also find the ratio in which C divides AB.
- Q. 15. Find $\lim_{x \rightarrow 0} f(x)$, where the function is $f(x) = \frac{|x|}{x}$; $x \neq 0$
 $= 0$; $x = 0$.

P.T.O

- Q. 16. If 4-digit numbers greater than 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, the digits are repeated ?
- Q. 17. 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 ?

OR

If 'A', 'B' and '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. Let $A = \{1, 2, 3, 4, 6\}$. Let R be the relation on A defined by
 $R = \{(a, b) : a, b \in A, b \text{ is exactly divisible by } a\}$.
- (i) Write R in roster form (ii) Find the domain of R (iii) Find the range of R.

SECTION - C

- Q. 19. Solve the system of inequalities graphically: $x + 2y \leq 10, x + y \geq 1, x - y \leq 0, x \geq 0, y \geq 0$
- Q. 20. In how many ways can the letters of the word PERMUTATIONS be arranged if the
 (i) all vowels are not together, (ii) there are always 4 letters between P and S?
- Q. 21. A line is such that its segment between the lines $5x - y + 4 = 0$ and $3x + 4y - 4 = 0$ is bisected at the point (1, 5). Obtain its equation.
- Q. 22. Calculate mean, Variance and Standard Deviation for the following distribution.

<i>Classes</i>	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100
<i>Frequency</i>	3	7	12	15	8	3	2

OR

The mean and standard deviation of 20 observations are found to be 10 and 2, respectively. On rechecking, it was found that an observation 8 was incorrect. Calculate the correct mean and standard deviation in each of the following cases : (i) If wrong item is omitted. (ii) If it is replaced by 12.

- Q. 23. Find the derivative of the following

(i) $\frac{x}{\sin^n x}$

(ii) $\frac{x^5 - \cos x}{\sin x}$

- Q. 24. Using first principle, find the differential coefficient of the function $f(x) = x \sin x$.

OR

Find the value of 'a' and 'b', so that $\lim_{x \rightarrow 1} f(x) = f(1)$, for the function

$$f(x) = \begin{cases} 5ax - 2b & ; x < 1 \\ 11 & ; x = 1 \\ 3ax + b & ; x > 1 \end{cases}$$
