**Vikas Bharati Public School**

**Sample Paper (Session 2024-25)**

**Class: XI**

**Subject: Mathematics (041)**

**Time: 3 hrs. M.M: 80**

**General Instructions:**

* **This question paper contains 5 sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.**
* **Section A has 18 M.C. Q’s and 2 Assertion- Reason based questions of 1 mark each.**
* **Section B has 5 very short answers type questions of 2 marks each.**
* **Section C has 6 short answer type questions of 3 marks each.**
* **Section D has 4 long answer type questions of 5 marks each.**
* **Section E has 3 case-based questions of 4 marks each with subparts**
* **This question paper contains 5 printed pages**

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| **Q No** |  **SECTION A** | **Marks** |
| 1. |  In a class of 80 students , 39 students play football and 45 students play cricket and 15 students play both the games. Then the number of students who play neither is 1. 0 $\notin A$ (b) 3 $\in A$ (c) {3} $\in A$ (d) none of these
 | 1 |
| 2. | If $8x+i \left(2x-3y\right)=3-8i$ and $x,y \in R$, then values of $x and y respectively are$1. $\frac{3}{8}$ , $\frac{35}{12}$ (b) $\frac{-3}{8 } , \frac{35}{12}$ (c) $\frac{3 }{8}$ , $\frac{-35}{12}$ (d) none of these
 | 1 |
| 3. | The value of $9^{1/3} . 9^{1/9}$ . $9^{1/27}$. ………to $\infty $is1. 1 (b) 3 (c) 9 (d) none of these
 | 1 |
| 4. |  If x<5 then (a)-x < -5 (b) -x$ \leq $-5 (c) -x > -5 (d) -x $\geq -5$ | 1 |
| 5. |  Domain of the real valued function $f\left(x\right)= \sqrt{4- x^{2}}$ is1. $(-2, \infty )$ (b) ($-\infty $ , $- $2 ) (c) ( -2 , 2) (d) [$-$2 , 2]
 | 1 |
| 6. | The number of ways in which 4 books on Mathematics and 3 books on English can be placed in a shelf , so that the books on the same subject always remain together is1. 144 (b) 210 (c) 288 (d) none of these
 | 1 |
| 7. | On real axis if A = [1,5] and B = [3,9], then A – B is1. (5,9) (b) (1,3) (c) [5,9) (d) [1,3)
 | 1 |
| 8. | If -3x + 17 < -13 then1. x $\in (10 , \infty )$ (b) x $\in [10 , \infty )$ ( c ) x $\in ( -\infty , 10)$ (d) x $\in [-10 , 10 )$
 | 1 |
| 9. | Four digit numbers are formed using the digits 0, 2, 3, 5 without repetition. The probability of such a number divisible by 5 is1. $\frac{1}{5}$ (b) $\frac{4}{5}$ (c) $\frac{1}{30}$ (d) $\frac{5}{9}$
 | 1 |
| 10. | $\lim\_{x\to \frac{3}{2}}[x]$ is equal to  (a) 1 (b) -1 (c) 2 (d) does not exist | 1 |
|  11. | 10 students are participating in a competition .There are 3 prizes . In how many different ways can the prize be won ?1. 60 (b) 9 (c) 720 (d) 120
 | 1 |
|  12. | For a function $f\left(x\right)= -|x-2 |$, the range is 1. $(-\infty , 0]$ (b) $[0 , \infty )$ (c) $(-\infty , 0)$ (d) $(0 , \infty )$
 | 1 |
| 13. | If all the terms of a GP be multiplied by the same non zero constant , then it remains a GP with the 1. Same ratio (b) reciprocal ratio (c) k ratio (d) 1/k ratio
 | 1 |
| 14. | Distance of a point (3,4,5) from the origin is :1. $\sqrt{50}$ (b) 3 (c) 4 (d) 5
 | 1 |
|  15. | The value of $\frac{sin50^{0}}{sin130^{0}}$ is1. 1 (b) 0 (c) -1 (d) can not be determined
 | 1 |
| 16. | What will be the coordinates of point on y axis which is at distance of $\sqrt{13}$ from the point (2 , 2, 3)1. (0,2,0) (b) (2,0,0) (c) (0 , 0, 2 ) (d) ( 2, 2, 2 )
 | 1 |
| 17. | Standard deviation for first 5 prime numbers are 1. 32 (b) 3.2 (c) 10.24 (d) 5.6
 | 1 |
| 18. | Radian measure of 750 is1. $\frac{7π}{12}$ (b) $\frac{π}{12}$ (c) $\frac{π}{15}$ (d) $\frac{5π}{12}$
 | 1 |
| 19. | Assertion (A) : Favorable outcomes for drawing 2 of spade or a club from a pack  Of 52 cards are 14Reason (R) : For favorable outcomes we look for the possible outcomes from  Sample space.1. Both A and R are true, and R is the correct explanation for A.
2. Both A and R are true, and R is not the correct explanation for A.
3. A is true but R is false.
4. A is false but R is true.
 | 1 |
| 20. | Assertion (A) : If $\frac{dsin^{3}x}{dx}$ is 3 $cos^{2}x$Reason (R) : For derivative of $u^{n}$w.r.t x , we use chain rule .1. Both A and R are true, and R is the correct explanation for A.
2. Both A and R are true, and R is not the correct explanation for A.
3. A is true but R is false.
4. A is false but R is true.
 | 1 |
|  | **Section B** |  |
| 21. | Find the distance of the point (-1, 1) from the line $12\left(x+6\right)=5(y-2 )$ | 2 |
|  | OR |  |
|  | Find the angle between the lines $y- \sqrt{3}x-5=0 $and $\sqrt{3}y-x+6=0$ |  |
| 22. | If the letters of the word INDIA are arranged in all possible ways as listed in dictionary, then find the rank of the word INDIA | 2 |
| 23 | Determine the value of k for which $\lim\_{x\to 5}f\left(x\right)=f(5)$$$ where f\left(x\right)=\left\{\begin{matrix}kx+1,&x\leq 5\\3x-5,&x>5\end{matrix}\right.$$ | 2 |
| 24. | Find the value of $ \frac{tan\left(\frac{π}{2}-x\right)sec\left(π-x\right)sin(-x)}{sin\left(π+x\right)cot\left(2π-x\right)cosec(\frac{π}{2}-x)}$ | 2 |
| 25. | Using Binomial theorem, expand $(\frac{ x}{3}+ \frac{1}{x })^{4}$ | 2 |
|  | **Section C** |  |
| 26. | Differentiate the following functions with respect to $x :$(1) $\frac{sin\sqrt{x}}{x^{2}+1}$ (2) $\left(x+2\right)^{3}(x^{2}-x+1)$  | 3 |
| 27. | A team of medical students doing their internship have to assist during surgeries at a city hospital. The probability of surgeries rate as very complex, complex, routine, simple or very simple are respectively 0.15, 0.20, 0.31, 0.26 and 0.08. Find the probabilities that a particular surgery will be rated (i) complex or very complex(ii) neither very complex nor very simple(iii) routine or complex | 3 |
|  | OR |  |
|  | Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify the examination is 0.05, and that of Ashima will qualify is 0.10. The probability that both will qualify is 0.02. Find the probability that (i) both Anil and Ashima will not qualify the exam.(ii) atleast one of them will not qualify the exam, and(iii) only one of them will qualify the exam. |  |
| 28. | Draw the graph of the function f:R$\rightarrow $ R defined by f(x) = $x^{3}$, x $\in $ R . Find its domain and range. | 3 |
| 29. | Prove that $\frac{sin5x-2sin3x+sinx}{cos5x-cosx}$ = $tanx$ | 3 |
| 30. | Find the conjugate and modulus of $\frac{1+i}{1-i}-\frac{1-i}{1+i}$ | 3 |
| 31. | Find the equation of the line which passes through the point (2,-4) and sum of whose intercepts on the axes is 5. | 3 |
|  | **Section D** |  |
| 32. | (1) Differentiate the following function with respect to $x$, using first principle: $$ f\left(x\right)= cos^{2}(x+1) $$(2)(i) Find the derivative of$ \sqrt{cosec\left(x^{2}+5\right)}.(sin3x)$ with respect to $x.$ (ii) Find the derivative of $\frac{x^{2}}{cos x+5x+7}$ | 3 + 2 |
| 33. | The mean and variance of eight observations are 9 and 9.25, respectively. If six of the observations are 6, 7, 10, 12, 12 and 13, find the remaining two observations.  | 5 |
| 34. | (i) $\frac{sinA.sin2A+sin3A.sin6A}{sinAcos2A+sin3Acos6A}$ = tan5A(ii)Find the value of 2$sin^{2}\frac{3π}{4} +3cos^{2}\frac{3π}{4}-2tan^{2}\frac{3π}{4} $ | 3+2 |
| 35. | Sumit is standing at the junction of two straight paths represented by the equations $3y=2x+4 $and $3x+4y=5$1. What is the sum of the slope of line $3y=2x+4$ and its y intercept ?
2. What is the slope of the line perpendicular to the line $3x+4y=5$ ?
3. Sumit wants to reach the path whose equation is given by 7$y=6x+8$ in the least time. Find the equation of the line along which he walks to reach the line 7$y=6x+8$
 | 2 + 3 |
|  | **Section E (Case Based Questions)** |  |
| 36. | The cable of a uniformly loaded suspension bridge hangs in the form of a parabola. The roadway which is horizontal and 100m long is supported by vertical wires attached to the cable , the longest wire being 30m and the shortest being 6 m. (i)Write the equation of the cable wire.(ii) Find the focus and length of latus rectum .(iii) Find the length of a supporting wire attached to the roadway 18 m from the middle. | 4 |
|  37. | In a game a girl rolls a die, if she gets an even number she will toss a coin if she gets head in a coin, she will win Indian Rupee Symbol (₹): Facts about the official Currency ...10 if she gets tail in coin she will win Indian Rupee Symbol (₹): Facts about the official Currency ...5.If she gets odd number in die she has to pay Indian Rupee Symbol (₹): Facts about the official Currency ...20 to organizer .On the basis of above information, answer the following:1. Find the total number of sample points in sample space.
2. Write the events A, B and C where A : Head appears, B : Tail appears and C: an odd number appears.
3. Which events are mutually exclusive and mutually exhaustive.
 | 4. |
| 38. | Riya writes a letter to four of her friends. She asks each one of them to copy the letter and mail to four different persons with instructions that they move the chain similarly. Assume that the chain is not broken and it costs 50 paise to mail one letter.Based on the given information, answer the following questions:(i) Which type of sequence is formed in the given situation ? (write full form). Write its  7th term.(ii) Find the amount spent on the postage when 5th set of letter is mailed.(iii) Riya wants to insert two numbers between 3 and 81 so that the resulting sequence  is G.P. Help Riya to find the numbers. .  | 4 |