

CBSEGuess Paper 2015

Mathematics-XII

Total Marks -100, Time- 3h

Section – A, One marks each, Section – B, four marks Each, Section – C, Six marks each

SECTION-A

1. If $P(A)=0.5$ $P(B)=0.6$ and $P(A \cup B)=0.8$ then find $P(A/B)$, A & B are independent Events.
2. If \vec{a} be a unit vector and $(\vec{a} - \vec{x}) \cdot (\vec{a} + \vec{x}) = 8$ then find $|\vec{x}|$
3. Evaluate $\int \frac{e^x}{1+e^{2x}} dx$
4. Find the slope of the curve $y = x^3 - 11x + 5$ at $(-2, 1)$
5. Examine the continuity of the function $f(x) = \frac{1}{x-3}$, $x \in \mathbb{R}$.
6. Find x & y if $2 \begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix} + \begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$

SECTION-B

7. Using the properties of determinant show that

$$\begin{vmatrix} 1 & a^2 + bc & a^3 \\ 1 & b^2 + ac & b^3 \\ 1 & c^2 + ab & c^3 \end{vmatrix} = -(a-b)(b-c)(c-a)(a^2+b^2+c^2)$$

8. A relation $R: \mathbb{N} \rightarrow \mathbb{N}$ is given by $R = \{(a, b) : b \text{ is divisible by } a\}$. check whether r is an equivalence relation or not. **OR**

Examine which of the following is the binary operation

i) $a * b = \frac{a+b}{2}$, $a, b \in \mathbb{N}$, ii) $a * b = \frac{a+b}{2}$, $a, b \in \mathbb{Q}$,

9. Find the value of $\tan \left[\frac{1}{2} \left\{ \sin^{-1} \left(\frac{2x}{1+x^2} \right) + \cos^{-1} \left(\frac{1-y^2}{1+y^2} \right) \right\} \right]$, $|x| < 1$, $y > 0$. $xy < 1$, **OR** if $x^3 y^4 = (x+y)^7$

find $\frac{dy}{dx}$

10. Find the matrix A satisfying the matrix equation

$$\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix} A \begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

11. If $\sin y = x \sin (a+y)$ then prove that $\frac{dy}{dx} = \frac{\sin^2(a+x)}{\sin a}$
12. If $y = \sin(m\sin^{-1}x)$ then show that $(1-x^2)y_2 + xy_1 + m^2 = 0$
13. Prove that the function $f(x) = \begin{cases} \frac{x}{|x|+2x^2}, & x \neq 0 \\ k & x = 0 \end{cases}$ is discontinuous at $x=0$ regardless of the value of k
14. Find the interval in which the function $f(x) = 8 + 36x - 3x^2 - 2x^3$ is i) increasing, ii) decreasing
15. A couple appeared for an interview for two vacancies of same post, the probability of husband's selection is $\frac{1}{7}$ and that of wife is $\frac{1}{5}$. What is the probability that i) both of them will select, ii) only one of them will select? **OR**
 A candidate has to reach to the Examination centre in time. Probability of him going by bus or scooter or by other means of transport are $\frac{3}{10}$, $\frac{1}{10}$, $\frac{3}{5}$ respectively. The probability that he will be late is $\frac{1}{4}$ and $\frac{1}{3}$ respectively, if he travels by bus or scooter. But he reaches in time if he uses any other mode of transport. He reached late at the centre. Find the probability that he travelled by bus.
16. Find the length and foot of perpendicular drawn from the point $(2, -1, 5)$ to the line $\frac{x-11}{10} = \frac{y-3}{7} = \frac{z-2}{5}$.
17. Evaluate $\int \frac{(3\sin x - 2)\cos x}{5 - \cos^2 x - 4\sin x} dx$ **OR** $\int e^x \frac{\sin 4x - 4}{1 - \cos 4x} dx$
18. If $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{b} = 2\hat{i} + 3\hat{j} - 5\hat{k}$ then verify that \vec{a} and $\vec{a} \times \vec{b}$ are perpendicular to each other or not.
19. Solve the differential equation $x \frac{dy}{dx} - y = \sqrt{x^2 + y^2}$

SECTION-C

20. Using the matrices solve the following system of linear equations $x+2y+z=7$; $x+3z=11$; $2x-3y=1$ **OR**

find the inverse of the matrix by elementary operation only $A = \begin{bmatrix} 3 & -2 & 4 \\ 3 & -2 & -5 \\ -1 & 1 & 2 \end{bmatrix}$

21. Find the local maximum and minimum values of the function $f(x) = \sin 2x - x$, in $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$.

22. Find the area of the region bounded by the curves $x^2+y^2=4$ and $y^2=4x$ by using of integration. **OR** Evaluate by limit as sum $\int_1^3 (x^2+3x-2)dx$

23. Find the equation of the plane passing through the line of intersection of the planes $x+y+z=6$, $2x+3y+4z=5$ and the point $(1,1,1)$ **OR** find the value of k , such that the plane $4x+4y-kz=0$ contains the line $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z}{4}$

24. Four bad eggs are accidentally mixed with 10 good once. Three eggs are drawn at random from the bag, find the probability distribution of the number of bad eggs drawn. Also find the mean and variance of the distribution.

25. Find the equation of the plane which pass through the point $(1,2,4)$ and parallel to the lines

$$\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(2\hat{i} + 3\hat{j} + 6\hat{k}) \text{ and } \vec{r} = (\hat{i} - 3\hat{j} + 5\hat{k}) + \mu(\hat{i} + \hat{j} - \hat{k})$$

26. Kellogges is a new cereal formed of mixture of bran and rice that contains at least 88 g of protein and at least 36 mg of iron. Knowing that bran contains 80g of protein and 40 mg of iron per kg and that of rice contains 100 g of protein and 30 mg of iron per kg. find the minimum cost of producing this cereal, if bran cost Rs 5 per kg and rice cost Rs 4 per kg.

Best of Luck
