BACK – UP TEST – 2 A

Mathematics – XI

Max Marks – 100
Time – 3 hr

6 – Marks

Q. 1. Show that: $\frac{1\times 2^2 + 2\times 3^2 + --- + n\times(n+1)^2}{1^2\times 2 + 2^2\times 3 + --- + n^2\times(n+1)} = \frac{3n+5}{3n+1}$

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

Q. 4. Find the derivative of the function $f(x) = x^2 \sin x$, using first principle.

Q. 5. Calculate mean, Variance and Standard Deviation for the following distribution.

Classes	***30 – 40***	***40 – 50***	***50 – 60***	***60 – 70***	***70 – 80***	***80 – 90***	***90 – 100***
Frequency	***3***	***7***	***12***	***15***	***8***	***3***	***2***

Q. 6. Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify the examination is **0.05** and that Ashima will qualify the examination is **0.10.** The probability that both will qualify the examination is **0.02.** Find the probability that,
(*i*) Both Anil and Ashima will not qualify the examination**.**
(*ii*) At least one of them will not qualify the examination.
(*iii*) Only one of them will qualify the examination**.**

4 – Marks

Q. 7. Find the sum to n terms of the series **: 5 + 11 + 19 + 29 + 41 - - - .**

Q. 8. Let S be the sum, P the product and R the sum of reciprocals of n terms in a ***G.P.*** Prove that $P^2R^n = S^n$.

Q. 9. Assuming that straight lines work as the plane mirror for a point, find the image of the point **(1, 2)** in the line $x - 3y + 4 = 0$ **.**

Q. 10. At what point the origin must be shifted so that the coefficients of x and y in the new equation obtained from $x^2 + y^2 + 2x + 4y - 2 = 0$ is **0.**

Q. 11. Find the **vertex, focus, latus rectum, axis** and **directrix** of the parabola **:** $4y^2 + 12x - 20y + 67 = 0$

Q. 12. Find the equation of the circle which passes through the point **(4 , 1)** and **(6 , 5)** and whose centre lies on the line $4x + y = 16$ **.**

Q. 13. 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. 14. Find the equation of the set of points P, the sum of whose distances from **A (4, 0, 0)** and **B(– 4, 0, 0)** is equal to **10.**

Q. 15. If **A(3, 2, 0), B(5, 3, 2), C(–9, 6, –3)** are the vertices of a triangle Find the length **AD,** if **AD** bisects the angle $\angle$ **BAC.**

P.T.O

Q. 16. Find the derivative of the following functions**:** ***(i)*** $\frac{x^5 - \cos x}{\sin x}$ ***(ii)*** $\frac{x}{\sin^n x}$

Q. 17. Find **:** $lim_{x \to 1} \left\{\frac{x-2}{x^2 - x} - \frac{1}{x^3 - 3x^2 + 2x}\right\}$

Q. 18. Find the value of **'*a*'** and **'*b*',** so that $\lim_{x \to 1} f(x) = f(1)$**,** for the function

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

Q. 19. 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. 20. 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. 21. 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**.**

Q. 22. The following is the record of goals scored by team A in a football session:

No. of goals	***0***	***1***	***2***	***3***	***4***
No. of matches	***1***	***9***	***7***	***5***	***3***

For the team **B,** mean number of goals scored per match was **2** with standard deviation **1.25** goals**.** Find which team may be considered more consistent?

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