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Code No. 16/1/3

PLEASURE TEST SERIES XI – 03

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Time Allowed : 180 Minutes **Max. Marks : 100**

SECTION – A

(This section contains 06 questions of **one mark** each.**)**

Q01. Determine the range of the relation R defined by R = {(x, x + 5) : x∈ {0, 1, 2, 3, 4, 5}}.

Q02. Write the value of k for which the line $(k-3)x-(4-k^2)y+k^2-7k+6=0$ is parallel to x-axis.

Q03. Find the derivative of $\frac{1}{ax^2+b}$ with respect to x.

Q04. What is the probability that a letter chosen at random from word EQUALITY is a vowel?

Q05. At what point the origin be shifted, if the coordinates of a point (4, 5) becomes (–3, 9)?

Q06. Identify the quantifier in : For every prime number p, $\sqrt{p}$ is an irrational number.

SECTION – B

Q07. Evaluate : $\lim_{x\to -3}\frac{x^2-9}{\sqrt{x^2+16}-5}$.

Q08. Find the coordinates of the points which trisect the line segment joining the points P(4, 2, –6) and Q(10, –16, 6).

Q09. Find the equation of a circle passing through (0, 0) and making intercepts of a and b on the axes.

OR

Find the coordinates of foci, the vertices, the eccentricity and the length of latus rectum of the ellipse $\frac{x^2}{49}+\frac{y^2}{36}=1$.

Q10. A young man visits a hospital for medical check-up. The probability that he has lungs problem is 0.45, heart problem is 0.29 and either lungs or heart problem is 0.47. What is the probability that he has both types of problems : lungs as well as heart? Out of 1000 persons, how many are expected to have both types of problem? What should be done to keep good health and the hospital away? Describe briefly.

Q11. Find the coefficient of x^5 in the product of $(1+2x)^6(1-x)^7$ using binomial theorem.

OR Show that the coefficient of the middle term in the expansion of $(1+x)^{2n}$ is equal to the sum of the coefficients of two middle terms in the expansion of $(1+x)^{2n-1}$.

Q12. Find the sum of the sequence 7, 77, 777, ... to n terms.

Q13. Determine the number of 5 cards combinations out of a deck of 52 cards if each selection of 5 cards has exactly one king.

Q14. Find the values of x and y, (x, y ∈ R), for which the complex numbers $-3+i\,x^2y$ and x^2+y+4i are conjugate of each other.

OR Convert $\frac{1+7i}{(2-i)^2}$ in the polar form.

Q15. If sin x = 3/5, cos y = –12/13, where x and y both lie in II quadrant, find the value of sin (x + y).

Q16. The mean of 5 observations is 4.4 and their variance is 8.24. If three of the observations are 1, 2 and 6, find the other two observations.

OR Find the mean and variance for the following data :

Classes	30.5 – 36.5	36.5 – 42.5	42.5 – 48.5	48.5 – 54.5	54.5 – 60.5
Frequency	4	10	14	27	45

Q17. If U = {1, 2, ..., 15}, A = {3, 6, 9, 12, 15}, B = {1, 2, 3, 4, 5}, C = {2, 4, 6, 8, 10, 12, 14} then find :
(a) A' (b) $A - B$ (c) $A \cup B$ (d) $B \cap C$.

Q18. Find the domain and range of the function $f(x) = \dfrac{x^2 - 1}{x - 1}$.

Q19. In ΔABC if $\dfrac{\sin A}{\sin C} = \dfrac{\sin(A - B)}{\sin(B - C)}$, prove that a^2, b^2, c^2 are in A.P.

SECTION – C

Q20. Prove that $n(n + 1)(n + 5)$ is a multiple of 3 for all $n \in N$. Use induction.

OR By using induction, show that $3x + 6x + 9x + \ldots$ upto n terms $= \dfrac{3}{2}n(n+1)x$.

Q21. Prove that : $\cos 10^\circ \cos 30^\circ \cos 50^\circ \cos 70^\circ = \dfrac{3}{16}$.

Q22. In a survey, it is found that 105 people take brand X pan-masala, 130 take brand Y pan-masala, and 145 take brand Z pan-masala. If 70 people take brand X as well as brand Y, 75 take brand Y as well as brand Z, 60 take brand X as well as brand Z and 40 take all the three brands, find how many people are surveyed who take the pan-masala of any kind? How many take brand Z pan-masala only?

Q23. (i) Solve graphically : $2x + y \geq -3$, $2x + y \leq 6$, $x \geq 0$, $y \geq 0$.

(ii) Draw the graph of the function $|x| + |x - 1|$.

Q24. If a is A.M. and b and c be two G.M.s between any two positive numbers, then prove that $b^3 + c^3 = 2abc$.

Q25. 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.

Q26. Differentiate $\dfrac{4\sin\theta}{2 + \cos\theta} - \theta$ with respect to θ.

OR Find the derivative of $\operatorname{cosec}\sqrt{x}$ with respect to x from the first principle.