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Code No. 16/2/9

PLEASURE TEST SERIES XI – 09

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For more stuffs on Maths, please visit : www.theOPGupta.com

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

SECTION – A

Q01. Determine the domain of the function $\frac{1}{\sqrt{2x+1}}$.

Q02. If $z_1 = 4 + 7i$ and $z_2 = 1 - i$, then for what value of x, $z_1 + x\,z_2$ is purely real.

Q03. Write the centre and radius of the circle $2(x+1)^2 + 2y^2 = 25$.

Q04. Write the middle term(s) in the binomial expansion of $(1 + 6x + 9x^2)^4$.

Q05. Rephrase the following sentence as conditional "if p then q" :
"Working hard ensures that you will pass the examination".

Q06. Identify the quantifier in : "All Mathematics teachers are males".

SECTION – B

Q07. Prove by using induction that $11^{n+2} + 12^{2n+1}$ is divisible by 133, for all $n \in N$.

OR Show that $2^n > n^2$, $n \geq 5$ by using induction, for all $n \in N$.

Q08. Draw the graph of $f(x) = |x - 2| + |x + 2|$.

Q09. Let f = {(1, 1), (2, 3), (0, –1), (–1, –3)} be a function from Z to Z defined as f (x) = ax + b, for some integers a and b. Find the value(s) of a and b.

Q10. Let A = {3x : x∈N}, B = {2x : x∈N} and C = {5x : x∈N}. Write the following sets :
(i) $A \cap B$ (ii) $B \cap C$ (iii) $C \cap A$ (iv) $A \cap (B \cup C)$.

Q11. In a survey of 600 students, 150 were found to be taking tea and 225 taking coffee, 100 were taking both tea and coffee. Find how many students were taking neither tea nor coffee? Some people take tea or coffee or both in excess. What are your views about this?

Q12. If $\frac{b+c-a}{a}, \frac{c+a-b}{b}, \frac{a+b-c}{c}$ are in A.P., show that $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are also in AP.

OR If there are (2n + 1) terms in an AP, prove that the sum of terms at odd places and the sum of terms at even places are in the ratio of (n + 1) : n.

Q13. If x^5 represents dishonest persons in a group given by $\left(2x^2 - \frac{3}{x}\right)^{11}$, then show that there is no dishonest person in this group.

Q14. Find the equations of two lines which can be drawn through the point (2, 2) to make an angle of 45° with the line $x + y = 2$.

OR The area of a triangle formed by a line with coordinate axes is $54\sqrt{3}$ square units and the perpendicular drawn from the origin to the line makes an angle of 60° with x-axis, find the equation of line.

Q15. Solve : $\sqrt{3}\cos x + \sin x = \sqrt{2}$.

Q16. A rod AB of length 15cm rests in between two coordinate axes in such a way that the end point A lies on x-axis and end point B lies on y-axis. A point P(x, y) is taken on the rod in such a way that $AP = 6cm$. Show that the locus of P is an ellipse.

Q17. From a frequency distribution consisting of 18 observations, the mean and the standard deviation were found to be 7 and 4 respectively. But on comparison with the original data, it was found that a figure 12 was miscopied as 21 in calculations. Calculate the correct mean and standard deviation.

Q18. If E and F are the events such that P(E) = 1/4, P(F) = 1/2 and P(E and F) = 1/8. Determine P(neither E nor F).

OR If four digit numbers greater than 5000 are randomly formed from the digits 0, 1, 3, 5 and 7, what is the probability of forming a number divisible by 5 when (i) repetition of digits is allowed? (ii) repetition of digits is not allowed?

Q19. If origin is the centroid of the triangle PQR with vertices $P(2a, 2, 6)$, $Q(-4, 3b, -10)$ and $R(8, 14, 2c)$, then find the value of a, b and c.

SECTION – C

Q20. Differentiate $\frac{2x-1}{2x+1}$ with respect to x, from the first principle.

OR (i) Differentiate $\sqrt{2-x}\,\sin x^3$ with respect to x.

(ii) Evaluate : $\lim\limits_{x\to 0}\frac{(a+x)^2\sin(a+x)-a^2\sin a}{x}$.

Q21. (i) Prove that : $\cos\alpha+\cos\beta+\cos\gamma+\cos(\alpha+\beta+\gamma)=4\cos\frac{\alpha+\beta}{2}\cos\frac{\beta+\gamma}{2}\cos\frac{\gamma+\alpha}{2}$.

(ii) Show that : $2\cos\frac{\pi}{13}\cos\frac{9\pi}{13}+\cos\frac{3\pi}{13}+\cos\frac{5\pi}{13}=0$.

Q22. The sides of a triangle are a, b and $\sqrt{a^2+ab+b^2}$. Prove that the greatest angle is 120^o.

Q23. Solve graphically : $x+3y\geq 3$, $3y-2x\leq 4$, $x+y\geq 5$, $y<4$.

Q24. How many five letter words, with or without having a dictionary meaning, can be formed from the letters of the word EQUATION? How many of these will have 3 vowels and 2 consonants?

Q25. Find the sum to n terms of : $\frac{1^3}{1}+\frac{1^3+2^3}{1+3}+\frac{1^3+2^3+3^3}{1+3+5}+\ldots$ upto n terms.

Q26. Find the square roots of 9 + 40i.

OR Reduce the complex number 2 – 2i in the polar form.

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HINTS & ANSWERS *for* PTS XI – 09 [2015-2016]

Q01. $x \in \left(-\frac{1}{2}, \infty\right)$

Q02. 7

Q03. $(-1, 0), \left(\frac{5}{\sqrt{2}}\right)$ units

Q04. $5670x^4$

Q05. If you work hard then you will pass the examination.

Q06. Quantifier is : All

Q09. Value of $a = 2$, $b = -1$

Q10. (i) $\{6x : x \in N\}$ (ii) $\{10x : x \in N\}$ (iii) $\{15x : x \in N\}$ (iv) $\{6x \text{ or } 15x : x \in N\}$

Q11. 325, Excess of tea or coffee is not good for health.

Q14. $x = 2,\ y = 2$ **OR** $x + \sqrt{3}y = 18$

Q15. $2n\pi + \frac{5\pi}{12},\ 2n\pi - \frac{\pi}{12}, n \in Z$

Q17. Mean : 6.5, Standard Deviation : 2.5

Q18. 3/8 **OR** (i) 2/5 (ii) 3/8

Q19. $a = -2, b = -16/3, c = 2$

Q20. $\frac{4}{(2x+1)^2}$ **OR** (i) $3x^2\sqrt{2-x}\ \cos x^3 - \frac{\sin x^3}{2\sqrt{2-x}}$ (ii) $a^2 \cos a + 2a \sin a$

Q24. 6720, 3600

Q25. $\frac{n}{24}(2n^2 + 9n + 13)$

Q26. $\pm(5 + 4i)$ **OR** $2\sqrt{2}\left[\cos\left(-\frac{\pi}{4}\right) + i\sin\left(-\frac{\pi}{4}\right)\right]$

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