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Code No. 15/12/1

PLEASURE TEST SERIES XI – 01

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

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

SECTION – A

Q01. Write the negation of the following statement :
"The square root of every positive number is positive."

Q02. Write all the possible subsets of $\{\phi, \{\phi\}\}$.

Q03. Is the relation R = {(2, 4), (3, 6), (2, 8), (1, 0)} a function? Justify your answer.

Q04. Solve : $\dfrac{|2-x|}{x-2} \geq 0$.

Q05. What is the value of $8\cos^3\dfrac{\pi}{9} - 6\cos\dfrac{\pi}{9}$.

Q06. If |z| = 2 and arg(z) = $\dfrac{\pi}{4}$ then find z.

SECTION – B

Q07. Let A and B be two finite sets such that n(A) = m and n(B) = p. If the ratio of number of elements of power sets of A and B is 64 : 1 and n(A) + n(B) = 32, find the value of m and p.

OR Using properties of sets, prove that $A \cup (B - A) = (A \cup B)$.

Q08. Find the ratio in which the line joining the points (2, 4, 5) and (3, 5, –4) is divided by XY-plane. Also find the coordinates of this point.

Q09. Evaluate the sum of the series : $\dfrac{1}{1.3} + \dfrac{1}{3.5} + \dfrac{1}{5.7} + \ldots$ upto n terms.

OR Evaluate the sum of the series : $1 + \dfrac{1}{2}(1+2) + \dfrac{1}{3}(1+2+3) + \ldots$ upto 40 terms.

Q10. Solve : $3\tan\theta + \cot\theta = 5\operatorname{cosec}\theta$.

Q11. Solve for x : $\dfrac{5x}{4} + \dfrac{3x}{8} > \dfrac{39}{8}$, $\dfrac{2x-1}{12} - \dfrac{x-1}{3} < \dfrac{3x+1}{4}$ and express on the number line.

Q12. Find the length of the perpendicular drawn from the point (4,–7) to the line joining the origin and the point of intersection of the lines 2x – 3y + 14 = 0 and 5x + 4y – 7 = 0.

Q13. 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 6m. Find the length of a supporting wire attached to the roadway 18m from the middle.

OR Find the eccentricity of an ellipse if the distance between its foci is same as the length of its latus-rectum.

Q14. Evaluate : $\lim\limits_{x\to 0} \dfrac{\sqrt{x}}{\sqrt{x+\sqrt{x+\sqrt{x}}}}$.

Q15. Using principle of mathematical induction, prove that $10^n + 3.4^{n+2} + 5$ is divisible by 9.

Q16. If $f(x)$ satisfies the equation $x^2 f(x) + f(1-x) = 2x - x^4$ then find the value of $f(1/3)$.

Q17. Find the number of arrangements of the letters of the word REPUBLIC.
How many arrangements start with a vowel? Also find how many of these arrangements won't have all the vowels together?

Q18. For what real values of θ, $\dfrac{1-i\sin\theta}{1+2i\sin\theta}$ is purely real?

Q19. For a group of 200 students, the mean and standard deviations of scores were found to be 40 and 15 respectively. Later on it was discovered that the score of 43 was wrongly taken as 34. Find the correct mean and standard deviation.

OR Find the mean deviation about the median for the following data :

x_i	3	6	9	12	13	15	21	22
f_i	3	4	5	2	4	5	4	3

SECTION – C

Q20. If A, B, C are three events associated with a random experiment, prove that :

$$P(A\cup B\cup C)=P(A)+P(B)+P(C)-P(A\cap B)-P(B\cap C)-P(C\cap A)+P(A\cap B\cap C).$$

OR In a relay race, there are five teams : A, B, C, D and E.

(a) What is the probability that A, B and C finish first, second and third, respectively.

(b) What is the probability A, B and C are first three to finish (in any order) (Assume that all finishing orders are equally likely).

Q21. A small firm manufactures sweaters of two types : Type A and Type B. The combined number of sweaters of both types that it can handle per day is at most 24. Sweater of Type A takes one hour to be made and Sweater of Type B takes half an hour. The maximum number of hours available per day is 16. Formulate this information in the form of inequalities and draw a graph representing the solution of these inequations.
The firm decides to sell the sweaters of Type B at very nominal prices to the poor people to help them be safe from the cold. Also in order to cover up the losses, the management of the firm urges to sell sweaters of Type A at a bit higher price. What do you conclude from their decision? Justify your answer.

Q22. Find the sum of the sequence 5, 5.5, 5.55, 5.555, … to 30 terms.

Q23. Show that the area of the triangle the equations of whose sides are $y=m_1x+c_1$, $y=m_2x+c_2$ and $x=0$ is given as $\dfrac{1}{2}\times\left(\dfrac{[c_1-c_2]^2}{m_2-m_1}\right)$ sq.units.

Q24. Differentiate $f(x)=\dfrac{4\sin x-2x-x\cos x}{2+\cos x}$ with respect to x.

Q25. If $\sin\theta=-\dfrac{4}{5}$, $\pi<\theta<\dfrac{3\pi}{2}$ then find the remaining trigonometric functions. Hence find $\sin 2\theta$.

OR In any triangle ABC, prove that : $(b^2-c^2)\cot A+(c^2-a^2)\cot B+(a^2-b^2)\cot C=0$.

Q26. (i) Evaluate : ${}^{15}C_8+{}^{15}C_9-{}^{15}C_6-{}^{15}C_7$.
(ii) If three consecutive coefficients in the expansion of $(1+x)^n$ are in the ratio 6 : 33 : 110. Determine the value of n and r.

HINTS & ANSWERS *for* PTS XI – 01 [2015-2016]

Q01. It is not true that the square root of every positive number is positive.

Q02. $\phi, \{\phi\}, \{\{\phi\}\}, \{\phi, \{\phi\}\}$

Q03. No, because the element 2 has two images in R as (2, 4) and $(2, 8) \in R$.

Q04. $(2, \infty)$ **Q05.** 1

Q06. $\sqrt{2} + \sqrt{2}\,i$ **Q07.** $m = 19, p = 13$ **Q08.** 5:4, $\left(\frac{23}{9}, \frac{41}{9}, 0\right)$

Q09. $S_n = \frac{n}{2n+1}$ OR $S_n = \frac{n(n+3)}{4}$, $S_{40} = 430$ **Q10.** $\theta = n\pi$; $2n\pi \pm \frac{\pi}{3}, n \in Z$

Q11. $x > 3$ **Q12.** 1 Unit

Q13. 9.11m (Approx.) OR $\frac{\sqrt{5}-1}{2}$ **Q14.** 0

Q16. 8/9 **Q17.** 8!, ${}^3C_1 \times 7!$, 36000 **Q18.** $\theta = n\pi, n \in Z$

Q19. 40.045, 14.995 OR 4.97

Q20. NCERT Page 407 Example 16 OR (a) 1/60 (b) 6/60

Q21. Inequations will be : $x + y \le 24, 2x + y \le 32, x \ge 0, y \ge 0$. Now solve graphically.

Q22. $\frac{50}{81}\left(269 + (0.1)^{30}\right)$ **Q23.** NCERT Page 230 Example 23

Q24. $\frac{\cos x(4 - \cos x)}{(2 + \cos x)^2}$

Q25. $\cos\theta = -\frac{3}{5}, \tan\theta = \frac{4}{3}, \operatorname{cosec}\theta = -\frac{5}{4}, \sec\theta = -\frac{5}{3}$, $\cot\theta = \frac{3}{4}$ and $\sin 2\theta = \frac{24}{25}$.

Q26. (i) 0 (ii) n = 12, r = 3.