OPG's PLEASURE TEST SERIES 02

Time : 180 Minutes **[2013-14]** **Max. Marks : 100**

Mathematics Class XI

General Instructions :

(i) The question paper consists of three parts A, B and C. Each question of each part is compulsory.

(ii) Section A (Very Short Answer Type) consists of 06 questions of 1 mark each.

(iii) Section B (Short Answer Type) consists of 13 questions of 4 marks each.

(iv) Section C (Long Answer Type) consists of 7 questions of 6 marks each.

(v) There is no overall choice. However internal choices in **four questions** of section B and **two questions** of section C have been provided.

(v) Use of calculator is not permitted.

SECTION – A

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

Q01. Write the converse of : "If I slap you then you will cry."

Q02. Write down the power set of $A = \phi$.

Q03. Find the value of $\lim_{x\to 0} x\sin\left(\frac{1}{x}\right)$.

Q04. Write the negation of : "Sum of 2 and 3 is 6."

Q05. Find the interval for x if $\frac{1}{1-x} \geq 0$.

Q06. Find the centre of the circle $x^2 + y^2 - 8x + 10y - 12 = 0$.

SECTION – B

(This section contains 13 questions of **four marks** each.**)**

Q07. Find the derivative of sin x + cos x with respect to x by the first principle.

OR Evaluate : $\lim_{\theta\to 0} \theta\left(3\operatorname{cosec} 2\theta - 2\cot 3\theta\right)$.

Q08. The centroid of a triangle ABC is at the point (1, 1, 1). If the coordinates of the vertices A and B are (3,–5, 7) and (–1, 7,–6) respectively, find the coordinates of the point C.

Q09. Find the equation of that hyperbola whose foci are (0, $\pm\sqrt{10}$) and which is passing through (2, 3). What is the name of this type of hyperbola?

Q10. Find the image of (3, 8) in the line mirror x + 3 y = 7.

Q11. How many numbers greater than 10, 00, 000 can be formed by using the digits : 1, 2, 0, 2, 4, 2 and 4?

Q12. Prove that ${}^{n}C_{r} + {}^{n}C_{r-1} = {}^{n+1}C_{r}$.

Q13. If $z_1 = 2 - i$ and $z_2 = 1 + i$, find $\left|\frac{z_1 + z_2 + 1}{z_1 - z_2 + i}\right|$.

OR Write the complex number $\frac{1+2i}{1-3i}$ in its polar form.

Q14. Prove the following by using principle of mathematical induction,

$$1^2 + 3^2 + 5^2 + \ldots + (2n-1)^2 = \frac{n(2n-1)(2n+1)}{3} \text{ for all } n \in N.$$

Q15. Let f = {(1,1), (2,3), (0,–1), (–1,–3), …} be a function from Z to Z defined by f (x) = a x + b for some integers a and b. Determine the values of a and b.

OR The function f is defined by $f(x) = \begin{cases} 1-x, & x < 0 \\ 1, & x = 0 \\ 1+x, & x > 0 \end{cases}$. Draw the graph of f (x).

Q16. Find the value of k so that the term independent of x in the expansion of $\left(\sqrt{x}+\frac{k}{\sqrt{x}}\right)^6$ is 540.

Q17. Find the value of $\tan\frac{13\pi}{12}$.

Q18. Prove that : $\cos^2 x+\cos^2\left(x+\frac{\pi}{3}\right)+\cos^2\left(x-\frac{\pi}{3}\right)=\frac{3}{2}$.

OR Prove that : $2(bc\cos A+ca\cos B+ab\cos C)=a^2+b^2+c^2$.

Q19. Two cards are drawn at random from a pack of 52 cards. Find the probability that the cards drawn are either both red or both aces. Playing cards are used in gambling. Is gambling a good practice? Justify your answer.

SECTION – C

(This section contains 7 questions of **six marks** each.**)**

Q20. The mean and variance of 7 observations are 8 and 16 respectively. If five of the observations are 2, 4, 10, 12, 14 then, find the remaining two observations.

Q21. A person writes a letter to four of his friends. He asks one of them to copy the letter and mail to four different persons with instructions that they move the chain similarly. Assume that the chain is not broken and that it costs 50 paisa to mail one letter. Find the amount spent on the postage when 8^{th} set of letter is mailed.

OR Show that : $\frac{1\times2^2+2\times3^2+...+n\times(n+1)^2}{1^2\times2+2^2\times3+...+n^2\times(n+1)}=\frac{3n+5}{3n+1}$.

Q22. If A = {1, 2, 3, 5, 6}, B = {2, 3, 4, 6, 7, 8} are sets associated with U = {1, 2, 3, …, 10}. State and verify De-Morgan's Laws for the sets A and B.

Q23. A solution of 8% boric acid is to be diluted by adding a 2% boric acid solution to it. The resulting mixture is to be more than 4% but less than 6% boric acid. If we have 640 litres of the 8% solution, how many litres of the 2% solution will have to be added?

OR Solve the following system of inequalities graphically :

$2x+y\le24,\ x+y\le11,\ 2x+5y\le40,\ x\ge0,\ y\ge0$.

Q24. From 50 students taking examination in Mathematics, Physics and Chemistry, each of the students has passed in at least one of the subjects, 37 passed Mathematics, 24 Physics and 43 Chemistry. At most 19 passed Mathematics and Physics, at most 29 Mathematics and Chemistry & at most 20 Physics and Chemistry. What is the largest possible number that could have passed in all the three subjects? It was brought in notice of the school administrators that a few students had bribed one of the staff members of school to get passed in the examination. Who should be held responsible, the students or the staff member? What is your point of view in this aspect? Is it a good practice? Why?

Q25. If $\tan x = 3/4,\ \pi < x < 3\pi/2$, find the value of $\sin(x/2)$, $\cos(x/2)$ and $\tan(x/2)$.

Q26. (i) Find the coefficient of x^5 in $(x+3)^8$.

(ii) Find $(a+b)^4-(a-b)^4$. Hence evaluate $[\sqrt{3}+\sqrt{2}]^4-[\sqrt{3}-\sqrt{2}]^4$.

Q02. $\{\phi\}$ **Q03.** 0 **Q05.** $x \in (-\infty, 1)$ **Q06.** (4,–5)

Q07. $\cos x - \sin x$ OR $\frac{5}{6}$ **Q08.** (1, 1, 2) **Q09.** $y^2 - x^2 = 5$

Q10. (–1,–4) **Q11.** 360 **Q13.** $2\sqrt{2}$ OR $\frac{1}{\sqrt{2}}\left(\cos\frac{3\pi}{4} + i\sin\frac{3\pi}{4}\right)$

Q15. $a = 2, b = -1$ OR See NCERT Example 22 Page 45 **Q16.** $k = 3$

Q17. $2 - \sqrt{3}$ **Q19.** 55/221 **Q20.** 6, 8 **Q21.** ₹43690

Q22. De-Morgan's laws : 'not (A and B)' is the same as '(not A) or (not B)' i.e., $(A \cap B)' = A' \cup B'$. Also, 'not (A or B)' is the same as '(not A) and (not B)' i.e., $(A \cup B)' = A' \cap B'$. Now do the remaining part yourself.

Q23. More than 320 L but less than 1280 L **Q24.** 14 **Q25.** $\frac{3}{\sqrt{10}}, -\frac{1}{\sqrt{10}}, -3$

Q26. (i) 1512 (ii) $8(a^3b + ab^3)$, $40\sqrt{6}$.

❖ Dear Student/Teacher,

I would urge you for a little favour. Please notify me about any error(s) you notice in this (or other Maths) work. It would be beneficial for all the future learners of Maths like us. Any constructive criticism will be well acknowledged. Please find below my contact info when you decide to offer me your valuable suggestions. I'm looking forward for a response.

Also I would wish if you inform your friends/students about my efforts for Maths so that they may also benefit.

Let's *learn* Maths with smile :-)

☞ For any clarification(s), please contact :
***MathsGuru* OP Gupta**
[Electronics & Communications Engineering, Indira Award Winner]
Contact Nos. : ***+91-9650 350 480 | +91-9718 240 480***
Mail me at : ***theopgupta@gmail.com***
Official Web-page : ***www.theOPGupta.com | www.theOPGupta.WordPress.com***
Official Blog-page : ***www.theOPGupta.blogspot.com***

Follow me on Twitter ***@theopgupta***