

LITTLE FLOWERS PUBLIC SR. SEC. SCHOOL
SUMMATIVE ASSESSMENT - I (MOCK TEST - II)

TIME : 3HRS.

CLASS – XI SUBJECT : MATHEMATICS

Max. Marks : 80

GENERAL INSTRUCTIONS :-

1. All questions are compulsory.
2. SECTION – A comprises of 6 questions of one marks each.
3. SECTION – B comprises of 11 questions of four marks each.
4. SECTION – C comprises of 5 questions of six marks each.

SECTION – A

Q. 1. Write the superset for {0, 3, 4} , {1, 2, 5} and {0, 3, 6}.

Q. 2. Consider $f : \mathbf{R} \rightarrow \mathbf{R}$ defined as $f(x) = \begin{cases} 1, & x > 0 \\ 0, & x = 0 \\ -1, & x < 0 \end{cases}$ and $g : \mathbf{R} \rightarrow \mathbf{R}$ given by $g(x) = [x]$, where $[x]$ is greatest integer function find $fog(x)$, $gof(x)$ if $0 < x < 1$

Q. 3. If $\cos(\alpha + \beta) = \frac{4}{5}$ and $\sin(\alpha - \beta) = \frac{5}{13}$, where α, β lie between 0 and $\frac{\pi}{4}$, then find $\tan 2\alpha$

Q. 4. Find x and y if, $x + iy = \frac{4 + 3i}{i^3}$

Q. 5. Solve for real 'x' : $-15 < \frac{3(x-2)}{5} \leq 0$

Q. 6. If a polygon has 27 diagonals, find the number of sides it can has.

SECTION – B

Q. 7. In a survey it was found that 21 people liked product A, 26 liked product B and 29 liked product C. If 14 people liked products A and B, 12 people liked products C and A, 14 people liked products B and C and 8 liked all the three products. Find how many liked (i) exactly one product.

(ii) exactly two product.

Q. 8. If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{2, 4, 6, 8\}$ and $B = \{2, 3, 5, 7\}$. Find A^c , B^c and hence show that $(A \cup B)^c = A^c \cap B^c$

Q. 9. If the relation R in the set A of points in a plane given by $R = \{(P, Q) : \text{distance of the point P from the origin is same as the distance of the point Q from the origin}\}$ does

(i) $(P, P) \in R$ (ii) If $(P, Q) \in R$ then $(Q, P) \in R$ (iii) $(P, Q) \in R$ and $(Q, S) \in R$ then $(P, S) \in R$

Q. 10. Find the value of $\tan\left(\frac{x}{2}\right)$ if $\sin x = -\frac{1}{4}$; x lies in IIIrd quadrant .

Q. 11. In a triangle ABC prove that : $\frac{b^2 - c^2}{a^2} \sin 2A + \frac{c^2 - a^2}{b^2} \sin 2B + \frac{a^2 - b^2}{c^2} \sin 2C = 0$

Q. 12. Using Principle of Mathematical Induction prove that :

$$\text{for all } n \geq 1, \frac{1}{2.5} + \frac{1}{5.8} + \frac{1}{8.11} + \dots + \frac{1}{(3n-1)(3n+2)} = \frac{n}{6n+4}$$

Q. 13. (i) If, $x - iy = \sqrt{\frac{a - ib}{c - id}}$, then prove that $(x^2 + y^2)^2 = \frac{a^2 + b^2}{c^2 + d^2}$

Q. 14. Find real θ such that, $\frac{3 + 2i \sin \theta}{1 - 2i \sin \theta}$ is purely imaginary

Q. 15. How many litres of water will have to be added to 1125 litres of the 45% solution of acid so that the resulting mixture will contain more than 25% but less than 30% acid content ?

Q. 16. If the different permutations of all the letter of the word **EXAMINATION** are listed as in a dictionary, how many words are there in this list starting with a vowel?

Q. 17. Find 'n' and 'r' if, ${}^n C_{r-2} : {}^n C_{r-1} : {}^n C_r = 1 : 3 : 5$

SECTION - C

Q. 18. Prove that, $\sin^3 x + \sin^3 \left\{ x + \frac{2\pi}{3} \right\} + \sin^3 \left\{ x + \frac{4\pi}{3} \right\} = -\frac{3}{4} \sin 3x$

Q. 19. By using principle of mathematical induction, prove that for all $n \geq 1$, $7^{2n} + 2^{3n-3} \cdot 3^{n-1}$ is divisible by 25.

Q. 20. If $a + ib = \frac{3}{2 + \cos x + i \sin x}$, prove that $a^2 + b^2 = 4a - 3$

Q. 21. Solve the system of inequalities graphically :
 $x + y \leq 70$, $x + y \geq 35$, $x \leq 45$, $y \leq 30$, $x \geq 10$, $y \geq 0$

Q. 22. On her vacations Veena visits four cities (A, B, C and D) in a random order. Find the number of ways in which she visits (i) A before B ? (ii) A just before B ? (iii) A before B and B before C?
