

Sample Paper

Faculty Higher Secondary School

Class –xi

Subject- Mathematics

General Instruction

- i. All the question are compulsory
- ii. Question 1 – 3 carries 1 marks
- iii. Question 4-8 carries 2 marks
- iv. Question 9-13 carries 4 marks
- v. Question 14- 15 carries 6 marks

1. Choose the correct one

- i. If $n(A) = 3$ then $n\{p(A)\} = \underline{\hspace{2cm}}$
a) 9 b) 8 c) 16 d) 7
- ii. Which of the following is true...
a) $A = (A \cap B) \cup (A - B)$ c) $A \cup (A - B) = A \cup B$
b) Both a and b d) none of a and b
- iii. $40^\circ 20'$ is equal to
a) $\frac{122\pi}{540}\text{rad}$ b) $\frac{131\pi}{540}\text{rad}$ c) $\frac{161\pi}{540}\text{rad}$ d) $\frac{91\pi}{540}\text{rad}$
- iv. The multiplicative inverse of complex number $\sqrt{5} + i3$ is
a) $\frac{\sqrt{5}}{\sqrt{14}} - i \frac{3}{\sqrt{14}}$ c) $\frac{\sqrt{5}}{14} - i \frac{3}{14}$
b) $\frac{\sqrt{5}}{14} + i \frac{3}{14}$ d) $\frac{\sqrt{5}}{14} + i \frac{2}{7}$
- v. The modulus of the complex number $\frac{1+i}{1-i}$ is
a) 2 b) 3 c) -1 d) 1
- vi. The 7th term in the expansion of $(3x - \frac{2y}{3})^{10}$ is
a) $\frac{4481}{3}x^4y^6$ b) $\frac{4482}{3}x^3y^6$ c) $\frac{4480}{3}x^4y^6$ d) $\frac{4478}{3}x^4y^5$

vii. The value of $\frac{8!}{6! \times 2!}$ is

- a) 26 b) 28 c) 24 d) 27

viii. The solution of $|x + 4| > 4$ is

- a) $(-\infty, -1) \cup (3, \infty)$ c) $(-\infty, 3]$
b) $(-1, \infty)$ d) $(-\infty, -5) \cup (3, \infty)$

2. If $A = \{-1, 2\}$ find $A \times A \times A$.

3. Find x , if $\frac{1}{8!} + \frac{1}{9!} = \frac{x}{10!}$.

4. If $f(x) = 3x^4 - 5x^2 + 9$, find $f(x - 1)$.

Or

If $f(x) = x + \frac{1}{x}$, prove that $\{f(x)\}^3 = f(x^3) + 3f\left(\frac{1}{x}\right)$.

5. Prove that $\cos\left(\frac{3\pi}{4} + x\right) - \cos\left(\frac{3\pi}{4} - x\right) = -\sqrt{2}\sin x$

Or

The minute hand of the clock is 1.5cm long. How far does its tip move in 40 minutes.

6. If $\sin A = \frac{4}{5}$ and $\cos B = \frac{5}{13}$, $0 < A, B < \frac{\pi}{2}$, then find the value of $\cos(A + B)$.

7. If $x - iy = \sqrt{\frac{a - ib}{c - id}}$, prove that $x^2 + y^2 = \frac{a^2 + b^2}{c^2 + d^2}$.

8. If the middle term in the expansion of $\left(\frac{1}{x} + x \sin x\right)^{10}$ is equal to $7\frac{7}{8}$, then find the value of x .

or

find the coefficient of x^4 in the $(1 + 2x)^4(2 - x)$.

9. There are 200 people working in a nuclear power plant, 120 have been working in the nuclear reactor R1, 50 In the nuclear reactor

R2 and 30 working in both R1 and R2. Find the number of individual working in

i. Reactor R1 but not in R2

ii. Reactor R2 but not in R1

10. Find the domain of the function f defined by $\sqrt{4-x} + \frac{1}{\sqrt{x^2-1}}$

Or

If $f(x) = x^2$. find $\frac{f(1.1)-f(1)}{(1.1-1)}$

11. Prove the following by using principal of mathematical induction

$$\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{n(n+1)} = \frac{n}{n+1}$$

12. Solve $x^2 - 5ix - 6 = 0$

Or

Convert the following in polar form $\frac{1+i3}{1-i2}$

13. Solve $(\sqrt{3} - 1) \cos x + (\sqrt{3} + 1) \sin x = 2$

14. Solve graphically $3x + 4y \leq 60$, $x + 3y \leq 30$, $x \geq 0$, $y \geq 0$

Or

Solve the inequality $\frac{x-2}{x+5} > 2$. Also represent the solution in number line.

15. The coefficient of $(r-1)$ th, r th and $(r+1)$ th terms in the expansion of $(x + 1)^n$ are in the ratio 1:3:5 find n and r .

