UNIFIED COUNCIL

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NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

Solutions for Class : 11 PCM

MATHEMATICS

1. **(B)** Since $x^2+1=0 \Rightarrow x=\pm i$.

2. **(B)** Let P (n): $\frac{1^3}{1}+\frac{1^3+2^3}{1+3}+\frac{1^3+2^3+3^3}{1+3+5}$ .....n terms)

$\Rightarrow$ P (n): $\sum\frac{1^3+2^3+.....+n^3}{1+3+5...(n \text{ terms})}$

$\Rightarrow$ P (n): $\sum\left\{\frac{\sum n^3}{n^2}\right\}$

$\Rightarrow$ P (n): $\sum\left\{\frac{1\not{n}^2\,(n+1)^2}{4\quad\not{n}^2}\right\}$

$\Rightarrow$ P (n): $\frac{1}{4}\sum(n^2+2n+1)$

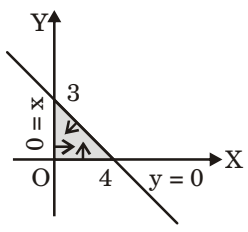
$\Rightarrow$ P (n): $\frac{1}{4}\left\{\sum n^2+2\sum n+\sum 1\right\}$

$\Rightarrow$ P (n): $\frac{1}{4}\left\{\frac{n(n+1)}{2}+\frac{1}{3}n\,(n+1)\,(2n+1)+n\right\}$

$\Rightarrow$ P (n): $\frac{1}{24}n\,\{3\,(n+1)+2\,(n+1)\,(2n+1)+6\}$

$\therefore$ P (n): $\frac{1}{24}n\,(2n^2+9n+13)$

3. **(B)** (B)



Therefore, the graph is the interior of a triangle including the points on the sides.

4. **(C)** The required number

$= \text{coeff.of } x^{2m} \text{ in } (x^0+x^1+.....+x^m)^4$

$= \text{coeff.of } x^{2m} \text{ in } \left(\frac{1-x^{m+1}}{1-x}\right)^4$

$= \text{coeff.of } x^{2m} \text{ in } (1-x^{m+1})^4\,(1-x)^{-4}$

$= \text{coeff.of } x^{2m} \text{ in } (1-4\,x^{m+1}+6x^{2m+2}+...)$

$\left(1+4x+...+\frac{(r+1)\,(r+2)\,(r+3)}{3!}x^r+...\right)$

$=\frac{(2m+1)\,(2m+2)\,(2m+3)}{6}-4m\,\frac{(m+1)\,(m+2)}{6}$

$=\frac{(m+1)\,(2m^2+4m+3)}{3}$

5. **(A)** With z = x + iy,

we have $\frac{1}{1-z}=\frac{1-x+iy}{2-2x}=\frac{1}{2}+i\frac{y}{2-2x}$

PHYSICS

6. **(C)** It falls with terminal velocity. (i.e., acquires a constant velocity)

7. **(C)** The pressure inside the soap bubble is more than that outside it.

8. **(C)** The total momentum of the ball and the earth is conserved.

9. **(A)** Viscous force is temperature dependent and velocity dependent.

10. **(B)** If the force of cohesion is greater than adhesion, then the liquid will not wet the solid.

CHEMISTRY

11. **(D)** All the given mixtures form buffer solutions. In case of (II) sodium acetate reacts with HCl to form CH_3COOH and NaCl.

12. **(B)** For the given reaction,

(i) ΔH is negative

(ii) ΔS is negative

13. **(A)** Exhaust system in limekilns drive away CO_2 formed so that the equilibrium shifts towards forward reaction.

14. **(B)** HCl, a strong acid, decreases the sulphide ion concentration by common ion effect. Secondly, dil. HCl is used to keep the sulphide on concentration at a minimum level. Thus, products of their respective sulphides precipitate out.

15. **(C)** In option (A) No violation of any rule

In option (B) Violation of Aufbau principle

In option (C) Violation of both Aufbau principle & Hund's rule.

In option (D) Violation of Aufbau principle.

CRITICAL THINKING

16. **(A)**

17. **(D)**

18. **(B)**

19. **(A)**

20. **(B)**