

Group 'A'

Attempt all questions.

11×1=11

1. If ${}^nC_{18} = {}^nC_{12}$, then ${}^{32}C_n = ?$
 a) 248 b) 496 c) 992 d) none of these
2. The number of terms in the expansion of $(2x + 3y)^{17}$ is:
 a) 16 b) 17 c) 18 d) 34
3. If z is any non zero complex number, then $\arg(z) + \arg(\bar{z})$ is equal of:
 a) 0 b) $\frac{\pi}{2}$ c) π^2 d) $\frac{3\pi}{2}$
4. In $\triangle ABC$, $a = 5$, $b = 7$ and $\sin A = \frac{3}{4}$, how many such triangles are possible?
 a) 1 b) 0 c) 2 d) infinitely many
5. If the line $lx + my + n = 0$ is a normal to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$, then
 a) $n + lg + mf = 0$ b) $n = lg + mf$
 c) $n - lg + mf = 0$ d) $n + lg - mf = 0$
6. If $\left| \vec{a} + \vec{b} \right| = \left| \vec{a} - \vec{b} \right|$, then
 a) $\left| \vec{a} \right| = \left| \vec{b} \right|$ b) $\vec{a} \parallel \vec{b}$
 c) $\vec{a} \perp \vec{b}$ d) none of these

7. $\int \sqrt{1 + \sin x} dx = ?$
 a) $-\sqrt{2} \sin\left(\frac{\pi}{4} - \frac{x}{2}\right) + c$ b) $\sqrt{2} \sin\left(\frac{\pi}{4} - \frac{x}{2}\right) + c$
 c) $-2\sqrt{2} \sin\left(\frac{\pi}{4} - \frac{x}{2}\right) + c$ d) none of these

8. The solution of $\frac{dy}{dx} = e^{x+y}$ is
 a) $e^x + e^y = c$ b) $e^x - e^y = c$
 c) $e^x + e^{-y} = c$ d) none of these

9. Let $P(n)$ be the statement ' $n(n+1)$ is divisible by 2'. Then,
 a) $P(1)$ is true but $P(2)$ is false
 b) $P(2)$ is true but $P(1)$ is false
 c) Both $P(1)$ & $P(2)$ are true
 d) Both $P(1)$ & $P(2)$ are false

10. The system $x - y = 1$ and $x - y = 5$ has
 a) one solution b) infinitely many solution
 c) no solution d) none of the above

11. In simplex method, the feasible basic solution must satisfy the
 a) non-negativity constraints b) negative constraint
 c) basic constraint d) common constraint

Group 'B'

8×5= 40

12. a) Define factorial. [1]
 b) Find the number of ways in which 5 courses out of 8 can be selected when 3 courses are compulsory. [2]
 c) A kabaddi coach has 14 players ready to play. How many different team of 7 players could the coach put on the court. [2]

13. a) ✓ If $z = x + iy$, then what does $|z|$ represents. [1]
 b) ✓ If $\alpha = \frac{1}{2}(-1 + \sqrt{-3})$, $\beta = \frac{1}{2}(-1 - \sqrt{-3})$, show that $\alpha^4 + \alpha^2\beta^2 + \beta^4 = 0$. [2]
 c) ✓ Express the complex number in Cartesian form whose modulus is 6 and amplitude is 60° . [2]
14. a) ✓ In any triangle ABC, if $2\cos A = \sin B : \sin C$ show that the triangle is isosceles. [2]
 b) ✓ Solve the triangle if $a = 2$, $b = \sqrt{6}$ and $c = \sqrt{3} - 1$. [3]
15. a) Find the equation of circle which touches both the axis and has its centre on the line $x - 2y = 3$. (2)
 b) Find the condition for the circle $x^2 + y^2 = a^2$ and $(x - c)^2 + y^2 = b^2$ to touch internally. [1]
 c) Find the focus and directrix of the parabola $x^2 = 12y$. [2]
16. a) ✓ Find the projection of \vec{a} on \vec{b} , if $\vec{a} = (3, 1, 2)$ and $\vec{b} = (2, -2, 4)$. [2]
 b) ✓ Prove that $\vec{a} \times \vec{b} = \vec{b} \times \vec{c} = \vec{c} \times \vec{a}$ if $\vec{a} + \vec{b} + \vec{c} = 0$. [2]
 c) ✓ Define dot product of vector. [1]
17. a) ✓ Evaluate: $\int \frac{1}{x(x^n - 1)} dx$. [3]
 b) ✓ Evaluate: $\int \frac{1}{\sqrt{a^2 - x^2}} dx$. [2]
18. a) Define order and degree of differential equation with suitable example. [2]
 b) Solve the differential equation:
 $\frac{dy}{dx} + \frac{1 + \cos 2y}{1 - \cos 2y} = 0$. [3]
19. ✓ Using the simplex method, maximize subjected to:
 $P = 15x + 10y$, subjected to: $2x + y \leq 10$ and $x + 3y \leq 10$, $x, y \geq 0$. [5]

20. a) Write the general term of the binomial expansion of $(x + a)^n$ & $(a - x)^n$. [2]
 b) ✓ Find the middle term in the expansion of $(x + \frac{1}{x})^{18}$. [2]
 c) ✓ Prove using vector method:
 $\cos(A + B) = \cos A \cos B - \sin A \sin B$. [4]
21. a) For the given series $n+2, (n-1) + 3(n-2) + \dots$ Find,
 i) n^{th} term [2]
 ii) sum of n^{th} term [2]
 b) ✓ Determine consistency and independence of the system of linear equation.
 $3x - 2y = 3, -4y + 6x = 9$ [2]
 c) ✓ Solve the equations $x = 2y$ and $3x + 2y = 8$ by using Cramer's rule. [2]
22. a) ✓ Evaluate: $\int \sqrt{x^2 - a^2} dx$ [4]
 b) ✓ Does $x \frac{dy}{dx} = \sqrt{x^2 + y^2} + y$ represent a homogenous differential equation?
 Give reason also solve the equation. [4]

'Good Luck'

$$\frac{1}{n} \log\left(\frac{P}{P_0}\right) + C //$$