

Group 'A'**[1×5=5]**

1. How many 4-digit number can be formed with no digit repeated by using the digits 3, 4, 5, 6, 7, 8 and 0?
a) 280 b) 560 c) 720 d) 840
2. The greatest positive integer which divide $n(n+1)(n+2)(n+3)$ for all $n \in \mathbb{N}$ is
a) 2 b) 6 c) 20 d) 24
3. Which of the following statement is true?
a) A triangle can have two right angles
b) A triangle can have two obtuse angles
c) A triangle can have two acute angles
d) A triangle can have all three angles less than 60° .
4. If α and β are the roots of $x^2 + x + 1 = 0$ then $\alpha^{2040} + \beta^{2040}$ is
a) -2 b) -1 c) 1 d) 2
5. $\int \sqrt{1 + \sin x} \, dx = ?$
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

Group 'B'

6. a) Differentiate between permutation and combination. [2]
b) In how many ways can the letters of the word 'PENCIL' can be arranged under the following condition.
i) How many begin with 'N'. [1]
ii) How many begin with 'E' and end with 'I'. [1]
iii) If there is no restriction. [1]
7. a) The numbers 1, 2, 3, ∞ are said to be natural number. These numbers are used to form various series.
i) Write the formula for the sum of first $(n+1)$ even natural numbers. [1]
ii) Write the formula for the sum of square of first $(n-1)$ natural numbers. [2]

$$x^2 + y^2 + z^2 = 1$$

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- b) Define consistent and independent with suitable example. [1]
8. a) Mayor Balen Shah plans to have circular information technology park of radius 2 km in Kathmandu. A separate area in the form of a segment formed by a chord of length 2 km is to be allotted exclusively for a canteen in the park. Find the area of the segment to be allotted for the canteen. [3]
- b) In a ΔABC , $a = 2\sqrt{2}$, $b = 2\sqrt{3}$ and $c = 75^\circ$. Find the other side and the angles. [2]
9. a) Evaluate: $\int \frac{1}{x^2 - a^2} dx$ [2]
- b) Evaluate: $\int \sqrt{\frac{9+x}{9-x}} dx$ [3]
10. a) Evaluate: $\int \frac{1}{a+b \cos x} dx$ when $a < b$ [3]
- b) Find $\int \sqrt{x^2 + 2} + 5 dx$. [2]
11. a) In ΔABC , prove that $\sin \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{bc}}$ Where 'S' is semi perimeter of ΔABC . [3]
- b) Solve the following equation by using cramer's rule: [2]
- $2x + 3y = 7$ and $3x + 5y = 9$
12. a) Define de-moivre's theorem [1]
- b) Find the quotient $\frac{2 \cos(\frac{9\pi}{4}) + i \sin(\frac{9\pi}{4})}{4(\cos(\frac{-3\pi}{2}) + i \sin(\frac{-3\pi}{2}))}$ in rectangular form. [3]
- c) If $z = (\cos \theta + i \sin \theta)$, Show that $z^n - \frac{1}{z^n} = 2i \sin n\theta$. [1]

$$x^2 > 2^2$$

$$a^2 \neq 2^2$$

$$a^2(2+1)$$

Best of Luck