

S. B. Roll. No.....

APPLIED MATHEMATICS-I
1st Exam/Common/0101/Nov'24
(For 2023 Batch Onwards)

Duration: 3Hrs.

Note: Use of graph paper is allowed.

M.Marks:50

SECTION-A

Q1. Do as directed any nine of the following.

9x1=9

- If $\left| \begin{matrix} 6 & k \\ 6 & 4 \end{matrix} \right|$ than value of k a) 8 b) 4 c) 6 d) 3
- If ${}^{18}C_r = {}^{18}C_{r+2}$, then r a) 6 b) 7 c) 8 d) 9
- The value of $\frac{7\pi}{12}$ radians in degree is a) 60° b) 75° c) 105° d) 120°
- Simplified form of $(3+i)^2$ is = a) $8+6i$ b) $8-6i$ c) $6+8i$ d) $6-8i$
- $\sin 34^\circ - \cos 56^\circ =$ _____.
- Slope of the line $x + y + 1 = 0$ is _____
- Two lines are _____ if their slopes are equal.
- The centre of the circle $x^2 + y^2 + 2gx - 2fy + c = 0$ is _____.
- $\sin C - \sin D = 2 \sin\left(\frac{C+D}{2}\right) \sin\left(\frac{C-D}{2}\right)$ (T/F).
- $\frac{x-5}{x^2-3x+2}$ is an improper fraction. (T/F)
- Conjugate of $5 - 2i$ is $5 + 2i$. (T/F)
- If $\sin A + \cos A = 1$. Then $\sin 2A = 1$. (T/F)

SECTION-B

Q2. Attempt any five questions.

5x4=20

- Resolve into partial fractions $\frac{2x+1}{(x^2-3x+2)(x-1)}$
- $\cos 24^\circ + \cos 55^\circ + \cos 125^\circ + \cos 204^\circ + \cos 300^\circ = \frac{1}{2}$
- Prove that $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = 3/16$
- Find the modulus and argument of $\sqrt{3} - i$.
- Find the equation of line passing through (2, 5) and perpendicular to line joining (1, 3) and (-5, 6).
- If a triangle having vertices A (2, 3), B (-4, 7), C (2, -1). Find the equation of median through B.
- Find the term independent of x (constant term) in the expansion of $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^9$.

SECTION-C

Q3. Attempt any three questions.

3x7=21

- A boy observes the angle of elevation of a mountain top to be 60° and after walking directly away from it on level ground through 100 metres, the angle of elevation is 45° . Find the height of the mountain and the distance between the mountain and first position of the boy.
- Solve the system of equations, using Cramer's rule
 $x + y = 5$



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$$y + z = 3$$

$$x + z = 4$$

iii. Find the equation of circle passing through three points (4, 1), (6, 5) and has its centre lies on the line $4x + y = 16$.

iv. When x is so small that its square and higher power may be neglected then show that

$$\frac{(9 + 7x)^{1/2} - (16 + 3x)^{1/4}}{4 + 5x} = \frac{1}{4} - \frac{17}{384}x$$

v. Maximise $Z = x + y$

Subject to: $-2x + y \leq 1$; $x \leq 2$; $x + y \leq 3$; x, y lies in first quadrant.

P.S.B.T.E. & I.T.

