S. B. Roll. No……..

APPLIED MATHEMATICS-I
1st Exam/Common/2952/Jun'2022
(For 2018 Batch Onwards)

Duration: 3Hrs. **M.Marks:75**

SECTION-A

Q1. a) Choose the correct answer. **15x1=15**

i. If $\log_x 81 = 4$ then x = a) 2 b) 3 c) 4 d) 7
ii. If (n+1)! = 12 (n-1)! then n = a) 1 b) 2 c) 3 d) 4
iii. The number of terms in the expansion of $(2+3x)^{-5}$ are a) 4 b) 6 c) 5 d) infinite
iv. If (K,1) , (5,5) and (10,7) are collinear, then K= a) 5 b) -5 c) 4 d) -4
v. Period of sin3θ = a) $\frac{\pi}{3}$ b) $\frac{\pi}{2}$ c) $\frac{2\pi}{3}$ d) π

b) Fill in the blanks.

vi. The value of $\tan 1020^0$ is _____
vii. Equation of a straight line parallel to x-axis is _____
viii. The radius of the circle $x^2 + y^2 + 2gx + 2fy = 0$ is _____
ix. Value of i^{17} is _____
x. Inverse of A is equal to _____

c) State True or False.

xi. $\sin 3A = 3\cos A - 4\sin^3 A$
xii. The points (3,4), (7,7) and (x,4) are collinear then x = 3
xiii. Factorial of negative integers is defined
xiv. A system has infinite solution if D≠0
xv. $3i^2 = -3$

SECTION-B

Q2. Attempt any six questions. **6x5=30**

a. A (10, 4), B (-4, 9), C (-2,-1) are the vertices of a triangle ABC. Find the equation of the altitude through B.
b. Resolve $\frac{2x+1}{x^2-3x+2}$ into partial fractions.
c. Find the inverse of A if A = $\begin{bmatrix} 3 & 8 \\ 2 & 1 \end{bmatrix}$
d. Show that $(\cos\alpha + \cos\beta)^2 + (\sin\alpha + \sin\beta)^2 = 4\cos^2\frac{\alpha-\beta}{2}$
e. If two vertices of a triangle are (2,3) and (-3,4) and its centroid is (1,3),find the third vertex.
f. If $a^2 + b^2 = 7ab$, prove that $\log\left(\frac{a+b}{3}\right) = \frac{1}{2}[\log a + \log b]$
g. Find the fourth term in the expansion of $\left(x + \frac{2}{x^3}\right)^6$
h. Prove that tan 13a - tan 9a – tan 4a = tan 13a tan 9a tan 4a
i. If the points (1, 2), (-2,-10) and (3,p) are collinear, then find the value of p.

SECTION-C

Q3. Attempt any three questions. **3x10=30**

i. From a light-house, the angles of depression of two ships on opposite sides of the light house are observed to be 30^0 and 45^0.If the height of the light house be 100 metres ; find the distance between the ships if the line joining them passes through the foot of the light-house.
ii. Prove that $\sin 20^0 \sin 40^0 \sin 60^0 \sin 80^0 = \frac{3}{16}$
iii. Find the equation of the circle passing through the points (0,0), (2,0) and (0,4)
iv. Show that when x is small,
$\sqrt{x^2+4} - \sqrt{x^2+1} = 1 - \frac{1}{4}x^2 + \frac{7}{64}x^4 + \ldots\ldots$
v. Solve with the help of matrices
x + y +z = 3
x + 2y +3z = 4
x + 4y +9z = 6