

S.B. Roll No.....

APPLIED MATHEMATICS-I
1st Exam/Common/2455/0251/5402/Nov'18

Duration: 3Hrs.

M.Marks:75

SECTION-A

Q1. a) Choose the correct answer.

15x1=15

- i. If $n_{P_4} = 20 \times n_{P_2}$ then n is equal to
 a) 7 b) 8 c) 2 d) 4
- ii. Modulus of $3 - 4i$ is
 a) 6 b) 5 c) 4 d) 3
- iii. Slope of line $3x + y - 2 = 0$ is
 a) 3 b) 2 c) -3 d) -2
- iv. Mid points internally of $(-a, b)$ and $(a, -b)$ is
 a) $\frac{a+b}{2}$ b) $\frac{a-b}{2}$ c) $a + b$ d) $(0, 0)$
- v. The point $(-4, -5)$ lies in quadrant
 a) 1st b) 2nd c) 3rd d) 4th

b) State True or False.

- vi. $\sin(A + B) = \sin A \cos B - \cos A \sin B$
- vii. Sum of first n natural numbers is $\frac{n(n+1)}{4}$.
- viii. If a, b, c are in A.P then $2b = 2a + c$.
- ix. Length of latus rectum of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is $\frac{2b^2}{a}$.
- x. The equation $3x + 4y + 5 = 0$ and $4x - 3y + 7 = 0$ represent perpendicular lines.

c) Fill in the blanks.

- xi. nth term of a G.P is _____
- xii. The eccentricity of parabola is _____
- xiii. The equation $x + 2y + 3 = 0$ to the slope form is _____
- xiv. Two lines are _____ if their slopes are equal.
- xv. Value of $\frac{\tan 70^\circ + \tan 65^\circ}{1 - \tan 70^\circ \tan 65^\circ} =$ _____

SECTION-B

Q2. Attempt any six questions.

6x5=30

- a. If $\cos A = \frac{5}{13}$ and A lies in the 4th quadrant, Show that $\frac{13 \sin A + 5 \sec A}{5 \tan A + 6 \operatorname{cosec} A} = -\frac{2}{37}$.
- b. Given $\log 2 = .30103$, $\log 5 = 0.69897$ Solve the equations $2^x \cdot 5^y = 1$, $5^{x+1} \cdot 2^y = 2$.
- c. Find the term independent of x in the expansion of $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^9$.
- d. Resolve into partial fraction $\frac{2x+1}{x^2-3x+2}$.
- e. Express the Complex number $-3 + 3i$ in polar form.
- f. Find the co-ordinates of foot of perpendicular from the point $(2, 3)$ on the line $y = 3x + 4$.
- g. Prove that $\frac{1}{\sec A + \tan A} = \frac{1 - \sin A}{\cos A}$.
- h. Sum the series $0.9 + 0.09 + 0.009 + \dots$ to nth term.
- i. The sum of two angles is $\frac{2\pi}{5}$ and their difference is 18° . Find the angles in degrees and radians.

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SECTION-C

Q3. Attempt any three questions.

3x10=30

- i. Find the equation of circle which passes through the points (4, 1) and (6, 5) and has its centre lies on the line $4x + y = 16$.
- ii. If $\sin\theta + \sin\phi = a$ and $\cos\theta + \cos\phi = b$ then show that $\sin(\theta + \phi) = \frac{2ab}{a^2 + b^2}$.
- iii. If x is so small that its square and higher powers are neglected show that :

$$\frac{\sqrt[3]{1-2x} + \sqrt{(1+x)^5}}{\sqrt{9+x}} = \frac{2}{3} - \frac{11}{54}x.$$

- iv. Find the co-ordinates of focus, vertex, the equation of directrix and axis of parabola $y^2 - 4y - 2x - 8 = 0$.
- v. 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 meters, the angle of elevation is 45° . Find the height of the mountain and the distance between the mountain and first position of the boy.