



UNIVERSITY OF THE PUNJAB
B.S. 4 Years Program : First Semester – 2020

Roll No. in Fig.

Paper: Elementary Mathematics-I (Algebra)

Roll No. in Words.

Course Code: MATH-111

Part-I (Compulsory)

Time: 30Min. Marks: 10

Attempt this Paper on this Question Sheet only.

Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

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Signature of Supdt.:

Q.1. Encircle the right answer cutting and overwriting is not allowed. (10x1=10)

Q.1 Encircle the correct answer in the given MCQs.

(i) The multiplicative inverse of (a, b) is -----

(a) $\left(\frac{a}{a+b}, \frac{b}{a+b}\right)$

(b) $\left(\frac{a}{a^2+b^2}, \frac{-b}{a^2+b^2}\right)$

(c) $\left(\frac{a}{a^2+b^2}, \frac{b}{a^2+b^2}\right)$

(d) None of these

(ii) The factorization of $2x^2 + 3y^2$ is -----

(a) $(\sqrt{2}x + i\sqrt{3}y)(\sqrt{2}x - i\sqrt{3}y)$

(b) $(\sqrt{2}x + \sqrt{3}y)(\sqrt{2}x - \sqrt{3}y)$

(c) $(\sqrt{2}x + i\sqrt{3}y)(\sqrt{2}x + i\sqrt{3}y)$

(d) None of these

(iii) The relation between (x, y) and (r, θ) is -----

(a) $x = \cos \theta, y = \sin \theta$

(b) $x = r \cos \theta, y = r \sin \theta$

(c) $x^2 + y^2 = a^2$

(d) None of these

(iv) If $A = \begin{bmatrix} i & 0 \\ 1 & -i \end{bmatrix}$ show that $A^4 =$ -----

(a) A

(b) A^2

(c) I

(d) None of these

(v) The roots of the equations $4^{1+x} + 4^{1-x} = 10$ are -----

(a) $\frac{\pm 1}{2}$

(b) ± 2

(c) ± 1

(d) None of these

(vi) Which term of the arithmetic sequence $-2, 4, 10, \dots$, is 148? is -----

(a) 25

(b) 26

(c) 27

(d) None of these

(vii) The number of terms in the expansion of $(2a + b)^{10}$ is -----

(a) 10

(b) 11

(c) 12

(d) None of these

(viii) The middle term of $\left(\frac{x}{2} + \frac{2}{x^2}\right)^{12}$ is -----

(a) $\frac{924}{x^6}$

(b) $\frac{926}{x^6}$

(c) $\frac{928}{x^6}$

(d) None of these

(ix) If $\tan \theta = \frac{8}{15}$ and terminal arm of the angle is in IIIrd quadrant then value of $\sin \theta =$ -----

(a) $\frac{-17}{8}$

(b) $\frac{17}{8}$

(c) $-\frac{8}{17}$

(d) None of these

(x) The value of $\sin\left(\frac{19\pi}{3}\right) =$ -----

(a) $\frac{2}{\sqrt{3}}$

(b) $\frac{\sqrt{3}}{2}$

(c) $\sqrt{3}$

(d) None of these



ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2. Solve the following:

(10x2=20)

- (i) Separate into real and imaginary parts $\left(\frac{-1}{2} + \frac{\sqrt{3}}{2}i\right)^3$
- (ii) If $z_1 = 1 + 2i$ and $z_2 = 3 - 2i$ then find the value of $|z_1 + z_2|$
- (iii) Find x, y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ -3 & 2 \end{bmatrix}$
- (iv) For what values of m will the roots of the given equation are equal
 $(m+1)x^2 + 2(m+3)x + 2m+3 = 0, m \neq -1$
- (v) Find the sum of the first 17 terms of the arithmetic series $4 + 9 + 14 + \dots$
- (vi) Find the term involving x^4 in the expansion of $(2x + 3y)^6$
- (vii) The A.M. of two numbers is 5 and their positive G.M. is 4. Find the numbers.
- (viii) Find the sum to n terms of the series $3 + 33 + 333 + \dots$
- (ix) An arc subtends an angle of 70° at the center of a circle and its length is 132 mm. Find the radius of the circle.
- (x) Prove that $\frac{1 - \sin \theta}{\cos \theta} = \frac{\cos \theta}{1 + \sin \theta}$

Q.3. Solve the following:

(6x5=30)

- (i) Show that $\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix} = 4abc$
- (ii) Solve the equation $x^{V^2} - x^{V^4} - 6 = 0$
- (iii) If α and β are the roots of $5x^2 - x - 2 = 0$, form an equation whose roots are $\frac{4}{\alpha}$ and $\frac{4}{\beta}$
- (iv) Find the sum to infinity of the series: of $r + (1+k)r^2 + (1+k+k^2)r^3 + \dots$
- (v) Find the 5th term in the expansion of $\left(\frac{3x}{2} - \frac{1}{3x}\right)^{11}$
- (vi) Prove that $\frac{1 - \sin \theta}{1 + \sin \theta} = (\sec \theta - \tan \theta)^2$