



# UNIVERSITY OF THE PUNJAB

First Semester – 2019

Examination: B.S. 4 Years Program

Roll No. in Fig. ....

Roll No. in Words. ....

PAPER: Elementary Mathematics-I (Algebra)  
Course Code: MATH-111 Part-I (Compulsory)

MAX. TIME: 30 Min.  
MAX. MARKS: 10

Signature of Supdt.:

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Division of marks is given in front of each question.

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

**Q.1. Encircle the right answer, cutting and overwriting is not allowed. (1x10=10)**

- (i) The property  $\forall a, b \in \mathbb{R}$ , either  $a < b$  or  $a = b$  or  $a > b$  is called ----  
 (a) Closure Property (b) Commutative Property  
 (c) Trichotomy Property (d) None of these
- (ii) The value of determinant  $\begin{vmatrix} 1 & -2 & 3 \\ -2 & 3 & 1 \\ 4 & -3 & 2 \end{vmatrix}$  is ----  
 (a) -25 (b) -20 (c) 7 (d) None of these
- (iii) If  $(-i)^{19} = \text{----}$   
 (a) 1 (b)  $i$  (c)  $-i$  (d) None of these
- (iv) The Product of all three cube roots of unity is ----  
 (a) 1 (b) -1 (c) 4 (d) None of these
- (v) If  $\alpha, \beta$  are the roots of the equation  $ax^2 + bx + c = 0$ . Then the value of  $\alpha^2 + \beta^2 = \text{----}$   
 (a)  $\frac{b^2 + 2ac}{a^2}$  (b)  $\frac{b^2 - 2ac}{a^2}$  (c)  $\frac{b^2 - ac}{a^2}$  (d) None of these
- (vi) Which term of the arithmetic sequence 5, 2, -1, ..., is - 85? is ----  
 (a) 30 (b) 31 (c) 32 (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 expansion of  $(1 - 3x)^{\frac{2}{3}}$  is valid if ----  
 (a)  $|x| < \frac{1}{3}$  (b)  $|x| < \frac{1}{2}$  (c)  $|x| < \frac{2}{3}$  (d) None of these
- (ix) If  $\tan \theta = \frac{8}{15}$  and terminal arm of the angle is in IIIrd quadrant then value of  $\sec \theta = \text{----}$   
 (a)  $-\frac{17}{15}$  (b)  $\frac{17}{15}$  (c)  $\pm \frac{17}{15}$  (d) None of these
- (x) The value of  $2 \sin^2 45^\circ + 3 \cos^2 45^\circ = \text{----}$   
 (a)  $\frac{5}{\sqrt{2}}$  (b)  $\frac{5}{2}$  (c)  $\frac{\sqrt{3}}{2}$  (d) None of these



# UNIVERSITY OF THE PUNJAB

First Semester – 2019

Examination: B.S. 4 Years Program

Roll No. ....

PAPER: Elementary Mathematics-I (Algebra)

MAX. TIME: 2 Hrs. 30 Min.

Course Code: MATH-111 Part – II

MAX. MARKS: 50

**ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED**

**Q.2 Solve the following Short Questions: (2 × 10 = 20)**

- (i) Separate into real and imaginary parts  $(\sqrt{3} + i)^3$ .
- (ii) If the matrix  $A = \begin{bmatrix} 2 & -1 & 3 & 0 \\ 1 & 0 & 4 & -2 \\ -3 & 5 & 2 & 1 \end{bmatrix}$  then find the value of  $AA'$ .
- (iii) If  $z_1 = 1 + 2i$  and  $z_2 = 3 - 2i$  then find the value of  $|z_1 + z_2|$ .
- (iv) Show that the roots of equation  $2x^2 + (mx - 1)^2 = 3$  are equal if  $3m^2 + 4 = 0$ .
- (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  $(2x + 3)^5$ .
- (vii) Find the  $n$ th term of the H.P.  $\frac{1}{9}, \frac{1}{12}, \frac{1}{15}, \dots$ .
- (viii) Find  $r$  when  $\theta = \frac{\pi}{7}$  radians,  $l = 1$  cm
- (ix) Prove that:  $\sin^3 \theta - \cos^3 \theta = (\sin \theta - \cos \theta)(1 + \sin \theta \cos \theta)$
- (x) Find the area of a sector with central angle of 0.5 radian in a circular region whose radius is 2 m

### SECTION III

(5 marks each long question)

(6 × 5 = 30)

- Q.3 Show that  $\begin{vmatrix} a+x & a & a \\ a & a+x & a \\ a & a & a+x \end{vmatrix} = x^2(3a+x)$ .
- Q.4 Solve the equation  $4^{1+x} + 4^{1-x} = 10$
- Q.5 If  $\alpha$  and  $\beta$  are the roots of  $5x^2 - x - 2 = 0$ , form an equation whose roots are  $\frac{3}{\alpha}$  and  $\frac{3}{\beta}$ .
- Q.6 Find the term independent of  $x$  in the expansion of  $\left(\frac{x}{2} + \frac{2}{x^2}\right)^{12}$
- Q.7 If  $\tan \theta = \frac{8}{15}$  and terminal arm of the angle is in 1st quadrant then value of  $\frac{3 \sin \theta + 4 \cos \theta}{\cos \theta - \sin \theta}$
- Q.8 Prove that  $\sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}} = \sec \theta - \tan \theta$