

FIRST PUC ANNUAL EXAMINATION - 2018

Time: 3-15 hours

MATHEMATICS (95)

Max Marks: 100

No. of Pages: 02

Total No. of Ques.: 50

- INSTRUCTIONS:** 1] The questions Paper has five parts A, B, C, D & E. Answer all the parts.
 2] In Part-A carries 10 marks, Part-B carries 20 marks, Part-C carries 30 marks
 Part-D carries 10 marks and Part-E carry 10 marks.
 3] Use the graph sheet for the questions on Linear inequalities in Part-D.

PART-A

I Answer All the following Questions : 10x1=10

- 1) Write the set $\{x : x \in \mathbb{R}, -4 < x \leq 6\}$ as an interval.
- 2) If $G = \{7, 8\}$ and $H = \{5, 4, 2\}$ find $H \times G$.
- 3) Convert 25° into Radian measure.
- 4) Find the modulus of the complex number $2 - 5i$.
- 5) Evaluate $\frac{5!}{2!3!}$
- 6) Find the slope of the line $3x - 4y + 10 = 0$
- 7) Find the 7th term of the sequence whose nth term is $a_n = \frac{-n^2}{2^n}$
- 8) Evaluate $\lim_{x \rightarrow 1} \left[\frac{x^2 + 1}{x + 100} \right]$
- 9) Write the negation of the statement " $\sqrt{7}$ is irrational".
- 10) Define a simple event.

PART-B

II Answer any TEN Questions : 10x2=20

- 11) If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{1, 2, 3, 4\}$ and $B = \{2, 4, 6, 8\}$ verify that $(A \cup B)^c = A^c \cap B^c$.
- 12) In a school there are 20 teachers who teach mathematics or physics, of these 12 teach mathematics and 4 teach both physics and Mathematics. How many teach physics?
- 13) If $\left(\frac{x}{3} + 1, y - \frac{2}{3}\right) = \left(\frac{5}{3}, \frac{1}{3}\right)$ find the values of x and y.
- 14) Prove that $\sin^2\left(\frac{\pi}{6}\right) + \cos^2\left(\frac{\pi}{3}\right) - \tan^2\left(\frac{\pi}{4}\right) = -\frac{1}{2}$.
- 15) Find the general solution of $2\cos^2x + 3\sin x = 0$.
- 16) Find the multiplicative inverse of the complex number $\sqrt{5} + 3i$.
- 17) Solve $5x - 3 < 7$ when (i) x is an integer and (ii) x is a real number.
- 18) Find the value of x for which the points $(x, -1)$, $(2, 1)$ and $(4, 5)$ are collinear.
- 19) Derive equation of the straight line whose x and y intercepts a and b is $\frac{x}{a} + \frac{y}{b} = 1$.
- 20) Verify the points $(0, 7, -10)$, $(1, 6, -6)$ and $(4, 9, -6)$ are the vertices of an isosceles triangle.
- 21) Evaluate $\lim_{x \rightarrow 2} \left[\frac{-3x^2 - x - 10}{x^2 - 4} \right]$
- 22) Write the converse and contrapositive of the statement "If the two lines are parallel then they do not intersect in the same plane."
- 23) The following values are calculated in respect of heights and weights of the students of a section of class XI.

	Height	Weight
Mean	162.6cm	52.36 kg
Variance	127.69cm ²	23.1361kg ² .

can we say that the weights show greater variation than the heights?

- 24) Given $P(A) = \frac{3}{5}$ and $P(B) = \frac{1}{5}$, Find $P(A \text{ or } B)$, if A and B are mutually exclusive events.

III Answer any TEN Questions : PART-C10x3=30

- 25) In a survey of 400 students in a school, 100 were listed as taking apple juice, 150 as taking orange juice and 75 were listed as taking both apple as well as orange juice. Find how many students were taking "Neither apple nor orange juice".

P.T.O.

- 26) If $f(x) = \sqrt{x}$ and $g(x) = x$ be two functions defined over the set of non-negative real numbers, Find $(f+g)$ (fg) and (f/g) .
- 27) Prove that $\tan 3x \cdot \tan 2x \cdot \tan x = \tan 3x - \tan 2x - \tan x$.
- 28) If $x + iy = \frac{a+ib}{a-ib}$ prove that $x^2 + y^2 = 1$
- 29) Solve : $\sqrt{3}x^2 - \sqrt{2}x + 3\sqrt{3} = 0$.
- 30) In how ways can the letters of the word 'PERMUTATIONS' be arranged if the (i) words start with P and ends with S and (ii) Vowels are all together..
- 31) Find the 13th term in the expansion of $(9x - \frac{1}{3\sqrt{x}})^{18}$
- 32) Insert 6 numbers between 3 and 24 such that the resulting sequence is an A.P.
- 33) The sum of first three terms of a GP. is $\frac{39}{10}$ and their product is 1. Find the common ratio and the terms.
- 34) Find the co-ordinate of focus, axis of the parabola, equation of the directrix and length of latus rectum of the parabola. $x^2 = -16y$.
- 35) Find the derivative of $\sin x$ with respect to x from first principles.
- 36) Verify by the method of contradiction $\sqrt{7}$ is irrational.
- 37) Two dice are thrown and the sum of the numbers which come up on the dice is noted. Let us consider the events A: the sum is even, B: the sum is multiple of 3. C: the sum is less than 4, D: the sum is greater than 11 which pair of these events are mutually exclusive.
- 38) A bag contains 9 discs of which 4 are red, 3 are blue and 2 are yellow. A disc is drawn at random from the bag. Calculate the probability that it will be (i) yellow (ii) not blue and (iii) either red or blue.

PART-D

IV Answer any SIX Questions :

6x5=30

- 39) Define Greatest integer function. Also write its graph. Domain and range of the function.
- 40) Prove that $\frac{\sin 9x + \sin 7x + \sin 5x + \sin 3x}{\cos 9x + \cos 7x + \cos 5x + \cos 3x} = \tan 6x$.
- 41) Prove by Mathematical induction that $1^2 + 3^2 + 5^2 + \dots + (2n-1)^2 = \frac{n(2n-1)(2n+1)}{3} \quad \forall n \in \mathbb{N}$
- 42) Solve the following system of inequalities graphically $3x + 4y \leq 60$, $x + 3y \leq 30$, $x \geq 0$, $y \geq 0$.
- 43) What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these (i) four cards are of the same suit (ii) are face cards (iii) two are red cards and two are black cards.
- 44) State and prove Binomial theorem for any positive integer n .
- 45) Derive the formula for distance of a points (x_1, y_1) from a line $Ax + By + C = 0$ and find the distance of the points $(3, -5)$ from the line $3x - 4y - 26 = 0$
- 46) Derive the coordinates of the point $R(x, y, z)$ dividing the line joining the points $P(x_1, y_1, z_1)$ and $Q(x_2, y_2, z_2)$ internally in the ratio $m:n$.
- 47) Prove that $\lim_{x \rightarrow 0} \left[\frac{\sin x}{x} \right] = 1$ where x is in radians and hence evaluate $\lim_{x \rightarrow 0} \left[\frac{\sin ax}{bx} \right]$
- 48) Find the mean deviation about the mean for the following data.

Marks Obtained	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Numbers of students	2	3	8	14	8	3	2

PART-E

V Answer any ONE Question :

1x10=10

- 49) a) Prove geometrically that $\cos(x+y) = \cos x \cos y - \sin x \sin y$. 6
 b) Find the sum of the series $1^2 + (1^2 + 2^2) + (1^2 + 2^2 + 3^2) + \dots$ 4
- 50) a) Derive equation of the ellipse in the form $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ 6
 b) Find the derivative of $\frac{x + \cos x}{\tan x}$ with respect to x . 4

