SRI BHAGAWAN MAHAVEER JAIN COLLEGE

Vishweshwarapuram, Bangalore 560004

Mock Examination Question Paper - January 2019

Course:	I PUC	**Subject:**	Mathematics
Max. Marks:	100	**Duration:**	3:15 hrs.

Instructions:
The question paper has five parts namely A, B, C, D, and E
Answer all parts, write question numbers correctly
Use the graph sheet for question on linear inequality in Part-D.

PART-A

I Answer ALL the questions: **10 x 1 = 10**

1. Define power set of a set.
2. Let A = {x,y,z}, B = {1, 2} Find the number of relations from A to B.
3. Convert -4 into degree measure (use $\pi = {}^{22}\!/_{7}$).
4. If 4x + i(3x – y) = 3+i(-6), where x,y $\in$R then find x and y.
5. Find the value of n, if ${}^{n}C_9 = {}^{n}C_8$.
6. Find the 7th term of the sequence $a_n = {}^{n^2}\!/_{2^n}$.
7. Find the equation of the line passing through (0,0) with slope m.
8. Evaluate $\lim_{x \to 0} \frac{ax+b}{cx+1}$.
9. Write the negation of the statement. “The number 2 is greater than 7”.
10. Write the sample space associated with the experiment. “A coin is tossed two times.”

PART-B

II Answer any TEN questions **10 x 2 = 20**

11. If A and B are disjoint sets and n(A) = 15, n(B) = 10. Find n(A$\cup$B) and n(A$\cap$B).
12. If A = {1, 2, 3}, B ={3, 4}, C={4,5,6}, then find (A$\cap$B) x C.
13. Let f(x) = $\sqrt{x}$, g(x) = x then find (i) (f+g) x, (ii) (fg) x
14. Find the value of sin75°.
15. A wheel make 360 revolutions in one minute. Through how many radians does it turn in one second?
16. Express the complex number (-5i) $\left(\frac{1}{8}i\right)$ in the form a + ib
17. Solve $\frac{5-2x}{3} \le \frac{x}{6} - 5$.
18. Find the distance between the lines 3x + 4y + 5 = 0 and 6x + 8y + 2 = 0.

19. On her vacation Veena vists 4 cities A,B,C and D in random order. What is the probability that she visits A before B?
20. Find the distance between the points (-3, 7, 2) and (2, 4, -1).
21. Evaluate $\lim_{x \to 0} \frac{ax + x\cos x}{b\sin x}$.
22. Write the converse and contrapositive of the implication. "If x is a prime number then x is odd".
23. Find the mean and variance of the following data: 6,7,10,12,13,4,8,12.
24. Find the equation of the line through the points (1,-1) and (3,5).

PART-C

III Answer any TEN questions **10 x 3 = 30**

25. In a survey of 600 students in a school. 150 students were found to be taking tea, 225 taking coffee and 100 were taking both tea and coffee. How many students were taking neither tea nor coffee?
26. If A x B = {(a,1), (a, 2), (a, 3), (b, 1) (b, 2) (b, 3)} then find the sets A and B. Hence find B x A.
27. If sinx = $3/5$, cosy = $-12/13$, where x and y both lie in second quadrant. Find the value of sin (x + y).
28. Represent the complex number z = $\frac{1}{1+i}$ in the polar form.
29. Solve $x^2 + \frac{x}{\sqrt{2}} + 1 = 0$.
30. In how many ways can the letters of the word PERMUTATIONS be arranged if:
    (i) the words start with P and end with S.
    (ii) vowels are all together.
31. Find the middle term in the expansion of $\left(\frac{x}{3} + 9y\right)^{10}$.
32. Find the sum of the sequence 7,77,777,------- to n terms.
33. Find the sum to n terms of the series whose n^{th} term is given by n^2+2^n.
34. Find the equation of the parabola which is symmetric about y-axis and passes through the point (2, -3).
35. Find the derivative of sinx w.r.t x using first principles.
36. Prove by the method of contradition that "$\sqrt{5}$ is irrational".
37. A committee of two persons is selected from two men and two women. What is the probability that the committee will have (i) no men (ii) 2 men.
38. In a certain lottery 10,000 tickets are sold and 10 equal prizes are awarded. What is the probability of not getting a prize if you buy (a) one ticket (b) two tickets.

PART-D

IV Answer any SIX questions **6 x 5 = 30**

39. Define modulus function. Draw its graph also write its domain and range.

40. Prove that $\cos^2 x+\cos^2\left(x+\frac{\pi}{3}\right)+\cos^2\left(x-\frac{\pi}{3}\right)=\frac{3}{2}$.

41. Prove by mathematical induction that $1^2+3^2+5^2+------+(n-1)^2=\frac{n(2n-1)(2n+1)}{3}$ for all n≥1.

42. Solve the following system of inequalities graphically.

$x + 2y \le 8$

$2x + y \le 8$

$x \ge 0$

$y \ge 0$

43. State and prove Binomial theorem for any positive integer n.

44. Derive an expression for the coordinates of a point that divides the line joining points A (x_1, y_1, z_1) and B $(x_2, y_2 z_2)$ internally in the ratio m:n.

45. Derive a formula to find the angle between two lines with slopes m_1 and m_2 . Hence find the angle between the lines y = $\sqrt{3}x+5$ and y = $\frac{1}{\sqrt{3}}x-2\sqrt{3}$.

46. A group consists of 7 boys and 5 girls. Find the number of ways in which a term of 5 members can be selected so as to have atleast one boy and one girl.

47. Prove geometrically that $\lim_{x\to 0}\frac{\sin x}{x}=1$ where x is measured in radians. Hence evaluate $\lim_{x\to 0}\frac{\tan x}{x}$.

48. Find the mean deviation about the mean for the following data.

Marks	**10-20**	**20-30**	**30-40**	**40-50**	**50-60**	**60-70**	**70-80**
No. of students	2	3	8	14	8	3	2

PART-E

V Answer any ONE question **1 x 10 = 10**

49 . (a) Prove geometrically that $\cos(x+y)=\cos x.\cos y-\sin x.\sin y$. Hence show that $\cos 2x=\cos^2 x-\sin^2 x$. **6**

(b) Find the sum to n terms of the series 1 x 2 x 3 + 2 x 3 x 4 + 3 x 4 x 5 +-----. **4**

50. (a) Define ellipse. Derive its equation in the form $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1\ (a>b)$. **6**

(b) Find the derivative of $\frac{x+\cos x}{\tan x}$. **4**

****