SRI BHAGAWAN MAHAVEER JAIN COLLEGE Vishweshwarapuram, Bangalore. **II PUC Mock Question Paper - 2**	**Course:** II PUC **Subject:** Basic Mathematics **Max. Marks:** 100 **Duration:** 3hours:15minutes

Instructions:

1. The question paper consists of five parts A, B, C, D and E.
2. Part A carries 20 marks, Part B carries 18 marks, Part C carries 27 marks, Part D carries 25 marks and Part E carries 10 marks.
3. Write the question numbers properly as indicated in the question paper.
4. Section A should be answered continuously at one or two pages of answer sheet and only the first answer is considered for marks in part A.
5. Use graph sheet for question number 55.

PART - A

I. Answer ALL the TWENTY questions **20 × 1 = 20**

1. If A $=\begin{bmatrix} 1 & 3 & -1 \\ -1 & 0 & 2 \end{bmatrix}$ and B = $\begin{bmatrix} 4 & -1 & 2 \\ 1 & 3 & -2 \end{bmatrix}$ then 2A+3B is

   (a) $\begin{bmatrix} 14 & 3 & 4 \\ 1 & 7 & -2 \end{bmatrix}$ (b) $\begin{bmatrix} 14 & 3 & 4 \\ 1 & 9 & -2 \end{bmatrix}$ (c) $\begin{bmatrix} 14 & 3 & 4 \\ 1 & 9 & 2 \end{bmatrix}$ (d) $\begin{bmatrix} 14 & 8 & 4 \\ 1 & 9 & -2 \end{bmatrix}$

2. The value of $\begin{vmatrix} x & 3 & y+z \\ y & 3 & z+x \\ z & 3 & x+y \end{vmatrix}$ is

   (a) x + y (b) x – y (c) 3x + 3y (d) 0

3. How many different signals can be made by taking 3 different coloured flags at a time from 7 different coloured flags?

   (a)110 (b) 210 (c) 310 (d) 410

4. A bag contains 8 red and 4 green marbles. Find the probability that a marble selected at random is red

   (a) $\frac{3}{4}$ (b) $\frac{2}{3}$ (c) $\frac{2}{5}$ (d) $\frac{1}{3}$

5. Negation of $p \rightarrow (q \wedge r)$ is

   (a) $p \wedge (q \vee \sim r)$ (b) $p \wedge (\sim q \vee \sim r)$ (c) $p \wedge (\sim q \vee r)$ (d) $p \wedge (q \vee r)$

6. The mean proportion of $\frac{1}{16}$ and $\frac{1}{25}$ is

   (a) $\frac{1}{5}$ (b) $\frac{1}{10}$ (c) $\frac{1}{15}$ (d) $\frac{1}{20}$

7. If sin A = $\frac{3}{5}$ then cos3A =

   (a) $\frac{117}{34}$ (b) $\frac{-117}{44}$ (c) $\frac{17}{44}$ (d) $\frac{=117}{54}$

8. The length of chord of the circle $x^2 + y^2 + 3x - y - 6 = 0$ intercepted by y-axis is

   (a) 4 (b) 5 (c) 6 (d) 7

9. If y = e^{3x+2} then $\frac{dy}{dx} =$

   (a) $3e^{3x+2}$ (b) e^{3x+2} (c) $2e^{3x+2}$ (d) $3e^{x+2}$

10. The value $\int 7.5^x \, dx$ is

    (a) $7.\frac{5^x}{log5} + c$ (b) $\frac{5^x}{log5} + c$ (c) $\frac{x^x}{logx} + c$ (d) $\frac{7^x}{log5} + c$

For the question number11 to15 choose appropriate answer given below

(1600, $\frac{64}{3}$, 126 , 5100 , $\frac{9}{5}$)

11. The number of ways in which 6 people be chosen out of 10 People if one particular person is always included is _____
12. The value of x if 32 : x = 75 : 50 is _____
13. 6% stock is being sold at ₹ 15 discount, the money required to buy ₹ 6000 stock is _____
14. A colour TV is marked for sale for ₹17,600 which include sales tax at 10%, the sales tax in rupees _____
15. The value of $\lim_{x\to -1} \frac{x^9+1}{x^5+1}$ is _____
16. If p, q and r are propositions with truth values F, T and F respectively, then find the truth values of the compound proposition $(\sim p \to q) \vee r$.
17. Find the true discount on ₹1380, due $1\frac{1}{2}$ years at 10% p.a. _____
18. Find the index of learning for 50% learning effect.
19. Find the equation of latus rectum of $y^2 = 3x$.
20. If the marginal cost of a product is $2x^2 - 4$x, where x is out put, find the totalcost of producing 16 units.

PART - B

II. Answer any NINE questions. **9 × 2 = 18**

21. If $A = \begin{bmatrix} 2 & -1 \\ 1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -3 & 2 \\ -1 & 4 \end{bmatrix}$ then Show that $(AB)' = B'A'$.
22. Find the value of n if ${}^nP_5 = 20\ {}^nP_3$.
23. A box contains 5 defective and 15 non defective bulbs. Two bulbs are chosen at random. Find the probability that both the bulbs are non-defective.
24. Write the converse, inverse and contrapositive of "If I get a seat then I will watch a cinema and have fun".
25. An article is sold at 40% gain on the cost price. Find the ratio of selling price and cost price.
26. A banker pays ₹2380 on a bill of ₹2500, 73 days before the legal due date. Find the rate of discount charged by the banker.
27. Prove that $\sin 105^0 + \cos 105^0 = \cos 45^0$
28. Prove that $\cos(45 - A)\cos(45 - B) - \sin(45 - A)\sin(45 - B) = \sin(A+B)$
29. Find the equation of parabola whose vertex is (0,0) and focus is (8, 0).
30. Evaluate $\lim_{x\to 0} \frac{\sin 3x + 7x}{4x + \sin 2x}$
31. Find the derivative of $x^{\sin x}$ with respect to x.
32. The radius of a sphere is increasing at the rate of 0.5 mt/sec.Find the rate of increase of its surface area.
33. Evaluate $\int (3x + 5)^2\ dx$.
34. Evaluate $\int \frac{3x^2}{1 + x^2} dx$.

PART- C

III. Answer any NINE questions. **9 × 3 = 27**

35. Solve by Cramer's Rule : 3x+4y=7; 7x-y=6

36. Prove that $\begin{vmatrix} 1 & a+b & a^2+b^2 \\ 1 & b+c & b^2+c^2 \\ 1 & c+a & c^2+a^2 \end{vmatrix} = (a-b)(b-c)(c-a)$

37. A die is rolled twice. If the sum of the numbers facing up wards is even find the probability that both are odd.

38. Three fair coins are tossed simultaneously .Find the probability of
    (a) getting one head (b) getting atmost one head (c) getting atleast two head

39. 2 men and 4 women can finish a job in 33 days but 3 men and 5 women can finish a job in 24 days.
    How many days will 5 men and 2 women can finish the same job.

40. A bill for ₹ 2920 was drawn on September 11 for 3 months and was discounted at 16% p.a for ₹2875.20. On what date was the bill discounted?

41. Ramesh has invested ₹4,300 partly in 4.5% stock at ₹72 and partly in 5% stock at ₹ 95,If the total income from both is 250, find the investment in both the types of stock

42. The price of T.V set inclusive of sales tax of 9% is ₹13,407. Find its marked price. If the S.T is increased to 13% how much more does the customer pay for the T.V ?

43. Find focus, equation directrix and length of latus rectum parabola $3x^2 + 8y = 0$.

44. Differentiate $\tan\sqrt{x}$ with respect to $\sqrt{x}$.

45. Water is being poured at the rate of 30mt^3/min into a cylindrical vessel whose base is a circle of radius 3mt.Find the rate at which the level of water is rising,

46. The product of two natural numbers is 64. Find the numbers if their sum is minimum.

47. Evaluate $\int x\, sinx\ dx$.

48. Evaluate $\int \frac{7x-1}{(1-2x)(1-3x)} dx$.

PART- D

IV. Answer any FIVE questions. **5 × 5 = 25**

49. Solve the following equations by matrix method

$$x - y - 2z = 3$$
$$2x + y + z = 5$$
$$4x - y - 2z = 1$$

50. Find the term independent of x in $\left(\frac{4x^2}{3} + \frac{3}{2x}\right)^9$

51. Determine the propositions $[(p \to q) \wedge (q \to r)] \to (p \to r)$ is tautology, contradiction or neither.

52. Resolve $\frac{4+7x}{(2+3x)(1+x)^2}$ into partial fractions.

53. Divide ₹3262 among x, y and z such that if ₹35, ₹15 and ₹12 are deducted from their respective shares, the remainders are in the ratio 3:5:8.

54. A company requires 100 hours to produce the first 10 units at ₹ 15 per hour. The learning effect is 80%.Find the total labour cost to produce a total of 160 units.

55. Solve the LPP graphically

    Minimize z = x – 7y +190 subject to the constraints

    $x + y \leq 8$

    $x \leq 5, y \leq 5, x + y \geq 4, x \geq 0, y \geq 0$

56. Prove that $Cos10^0\ Cos30^0\ Cos50^0\ Cos70^0 = \frac{3}{16}$

57. If $x^2+2xy+3y^2=1$ then prove that $y_2 = \frac{-2}{(x+3y)^2}$

58. Find the area bounded by the parabola $y^2 = 4x$ and the line $x – y = 0$.

PART E

V. Answer the following.

59. Show that the points (1, 0),(2, −7),(8,1),(9,-6) are concyclic. (6)

    OR

    If n is a rational number and a is a is non zero real number then prove that $\lim_{x \to a} \frac{x^n - a^n}{x - a} = n.a^{n-1}$ (6)

60. From the top of a cliff, the angles of depression of two boats in the same vertical plane as the observer are 30° and 45°. If the distance between the boats is 100 metres. Find the height of the cliff. (4)

    Or

    Find the value of $(1.02)^6$ using Binomial theorem. (4)