



SRI BHAGAWAN MAHAVEER JAIN COLLEGE

Vishweshwarapuram, Bangalore.

MOCK-1 2021

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 10 marks, Part B carries 20 marks, Part C carries 30 marks, Part D carries 30 marks and Part E carries 10 marks.
- 3) Write the question numbers properly as indicated in the question paper.

PART - A

I. Answer ALL questions

10×1=10

1. Define diagonal matrix with an example.
2. How many different arrangements can be made with the letters of the word "MONDAY".
3. A card is drawn from a pack of 52 playing cards. What is the probability that it is a queen?
4. Symbolise the proposition 'y + 4 ≠ 4 or e is not vowel'
5. Find the mean proportion of the $\frac{1}{16}$ and $\frac{1}{25}$.
6. Find the present value of ₹750 due 4 months hence at 15% p.a.
7. What is the market value of 12% stock when an investment of ₹ 6900 produces an income of ₹720?
8. Find the index of learning for 80% learning effect.
9. Find the value of $\sin 105^\circ$.
10. If the radius of the circle $x^2 + y^2 + 4x - 2y - k = 0$ is 4 units find k.

PART - B

II. Answer any TEN questions.

10×2=20

11. Solve for x and y : $\begin{bmatrix} 2 & -1 & 3 & 1 \end{bmatrix} \begin{bmatrix} x & y \end{bmatrix} = \begin{bmatrix} 10 & 2 \end{bmatrix}$
12. Prove that the value of the determinant is zero if any two rows (or columns) are identical.
13. In how many ways can 10 beads of different colours be strung into a necklace if the red, green and yellow beads are always together.

14. In how many ways can 6 people be chosen out of 10 people if one particular person is always included.
15. A number chosen from 1 to 50. What is the probability that the number is a multiple of 8?
16. If $p: \sqrt[3]{3}$ is an integer, $q: 2$ is an odd number and $r: 5$ is a prime number then what is the truth value of $(p \leftrightarrow q) \wedge r$?
17. Two numbers are in the ratio 3:5 .If 5 is added to each, they are in the ratio 2:3 find the ratios.
18. 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.
19. What is the quoted value of 12% stock if it earns an interest of 8% after deducting the income tax of 8% ?
20. Ramu paid ₹ 60 as sales tax on a Titan watch worth ₹ 1,200 .Find the rate of sales tax.
21. What is the angle of elevation of the sun when the length of the shadow of a pole is $\frac{1}{\sqrt{3}}$ times the height of the pole?
22. Prove that $\sin (45^\circ + A) + \cos (45^\circ + A) = \sqrt{2} \cos A$.
23. If $\tan \alpha = \frac{n}{n+1}$, $\tan \beta = \frac{1}{2n+1}$ then show that $\alpha + \beta = \frac{\pi}{4}$.
24. Find the equation of the circle whose centre is (-2,3) and passing through the centre of the circle $x^2 + y^2 - 6x + 4y + 9 = 0$.

PART- C

III. Answer any TEN questions.

10×3=30

25. If $f(x) = x^2 - 5x + 7$,find $f(A)$ where $A = \begin{bmatrix} 3 & 1 & -1 & 2 \end{bmatrix}$
26. P.T $\begin{vmatrix} 1 & a & bc & 1 \\ b & ca & 1 & c \\ ab & 1 & c & ab \end{vmatrix} = (a - b)(b - c)(c - a)$
27. Find the number of permutations of the letters of the word “COMMITTEE”.
- How many of them begin with T and end with T.
 - In how many all the vowels are together.
 - In how many no two vowels are together.
28. A couple has two children. Find the probability that both are boys ,if it is known that
- one of the children is a boy
 - older child is a boy.
29. A natural number is chosen at random from among the first 300. What is the probability that the numbers chosen is divisible by 3 or 5?
30. Expand $\left(x^2 + \frac{3}{x}\right)^4$ using binomial theorem.
31. Resolve into partial fractions $\frac{7x-1}{(1-2x)(1-3x)}$.

32. Write converse, inverse and contra positive of conditional

“ If $x \in A \cap B$ then $x \in A$ and $x \in B$ ”

33. Two numbers are in the ratio 3:4. If the sum of their squares is 900. Find numbers.

34. 3 carpenters can earn ₹360 in 6 days working 9 hours a day. How much will 8 carpenters can earn in 12 days working 6 hours a day.

35. A person invests ₹ 3240 in a stock at 108 and sells when the price falls to 104. How much stock at 130 can the person now buy.

36. A shopkeeper buys a mobile set at a discount rate of 20% from the wholesaler, the printed price of the mobile set being ₹ 1,600 and the rate of sales tax is 6%. The shopkeeper sells it to the buyer at the printed price and charges tax at same rate. Find

i) The price at which mobile set can be bought from wholesaler.

ii) The VAT paid by the shopkeeper.

37. Show that $\cos(A+B) \cos(A-B) = \cos^2 A - \sin^2 B$.

38. Find the equation of the tangent to the circle $x^2 + y^2 + 2x + 4y - 4 = 0$ which is parallel to the line $5x + 12y + 6 = 0$.

PART- D

IV. Answer any SIX questions.

6×5=30

39. A man has 10 relatives, 4 of them all ladies, 3 gentlemen and 3 children. In how many ways can he invite 7 relatives to dinner party so that

(i) there are exactly 2 ladies, 3 gentlemen and 2 children

(ii) there are exactly 2 gentlemen and at least 3 ladies

(iii) there are exactly 3 children, at least 1 lady and at least 2 gentlemen.

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

41. Resolve into partial fractions $\frac{x^3 + 7x^2 + 17x + 11}{x^2 + 5x + 6}$.

42. Check whether $p \vee (q \wedge r)$ and $(p \vee q) \wedge (p \vee r)$ are logically equivalent.

43. Divide 17,640 among P, Q, R and S such that 'Q' gets $\frac{2}{5}$ th of 'P', 'R' gets $\frac{5}{8}$ th of 'Q' and 'S' gets $\frac{2}{13}$ th of the sum of Q and R.

44. A bill for ₹12900 was drawn on 3 Feb 2004 for 6 months and discounted on 13 March 2004 at 8% p.a. For what sum was the bill discounted and how much did the bill discount and how much did the banker gain in this transaction?

45. XYZ company supplies water tankers to the government. The first water tanker takes 20,000 hrs. The government auditors suggest that there should be 90% learning effect rate. The management expects an order of 8 water tankers in the next year. What will be the labour cost the company will incur at the rate of ₹ 20 per hour.

46. Minimise $z = x - 7y + 190$ subject to the

$$x + y \leq 8$$

$$x \leq 5, y \leq 5, x + y \geq 4, x \geq 0, y \geq 0 \text{ graphically.}$$

47. 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.

48. Prove that $\cos 20^\circ \cdot \cos 40^\circ \cdot \cos 60^\circ \cdot \cos 80^\circ = \frac{1}{16}$

PART- E

V. Answer any ONE question.

1×10=10

49. (a) Solve the system of equations by matrix method. (6)

$$3x + y + 2z = 3$$

$$2x - 3y - z = -3$$

$$x + 2y + z = 4$$

(b) Find the value of $(98)^4$ using binomial theorem upto 4 decimal places. (4)

50.(a) Show that the points $(2,0), (-1,3), (-2,0)$ and $(1,-1)$ are concyclic. (6)

(b) A manufacturer produces 2 products P and Q. Each P requires 4 hours on machine M & 2 hrs on machine M_1 . Each Q requires 2 hours on machine M_1 and 5 hrs on machine M_2 the available total time on M_1 is 2 hrs and on M_2 is 24 hours profit per unit of P is Rs. 6 and that of Q is Rs. 8 what Quantities of each should be produced and sold to maximize profits formulate the L P P. (4)