



JAIN COLLEGE, J C Road Bangalore
Mock Paper -1, March - 2021
II PUC –Basic Maths (75)

I. Answer all the following questions

10x1=10M

1. Find x if $\begin{vmatrix} 4 & x \\ x & 16 \end{vmatrix} = 0$
2. How many different arrangements can be made with the letters of the word "MONDAY"?
3. A coin is tossed thrice. Write the sample space.
4. If p and q are propositions with truth value F and T respectively. Find the truth value of $\sim q \rightarrow p$
5. If $5:20 = 3:x$ Find the value of x .
6. A bill was drawn on 14-03-2020 for 3 months. When is the legally due date?
7. What rate of interest is obtained by investing in 19% stock at 180?
8. Find the index of learning for 70% learning effect.
9. If $\sin A = \frac{3}{5}$. Find $\sin 3A$.
10. Find the centre of the circle $x^2 + y^2 - 4x - y - 5 = 0$.

II. Answer the following questions.

10x2=20M

11. If $\begin{bmatrix} 2 & -1 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 10 \\ 2 \end{bmatrix}$ Find x and y .
12. 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 find $A - 3B$.
13. In how many ways the word "CARROM" be arranged such that the 2R's are always together?
14. If $nC_8 = nC_{12}$ Find the value of nC_5
15. One ticket is drawn at random from a bag containing 20 tickets numbered 1 to 20. Find the probability that it is a multiple of 2 or 5.
16. Negate the proposition: $[p \rightarrow (q \wedge r)]$
17. Two numbers are in the ratio 3:5. If 5 is added to each of them, the new ratio will be 2:3. Find the numbers.
18. BD and BG on a certain bill due after sometime are Rs.1250 and Rs.50 respectively. Find the face value of the bill.
19. How much of 8% stock at 96 can be purchased for Rs.4800? Also find the income obtained.
20. Ramu paid Rs.60 as sales tax on a Titan Raga watch Rs.1200. Find the rates of sales Tax.
21. Find the angle of elevation of the sun when the length of the shadow of a pole is $\sqrt{3}$ times the height of the pole.
22. Prove that $\cos 3A = 4\cos^3 A - 3\cos A$
23. Find the value of $\tan 15^\circ$
24. Find the equation of the circle, two of the diameters are $x + y = 6$ and $x + 2y = 4$ and its radius is 10 units.

III. Answer the following questions.**10x3=30M**

25. If $A = \begin{bmatrix} 1 & 2 \\ 1 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 4 & -3 \\ 2 & 1 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 0 \\ -2 & 4 \end{bmatrix}$ show that $A(B + C) = AB + AC$
26. Prove that $\begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{vmatrix} = (a - b)(b - c)(c - a)$
27. Find the number of permutations of the letters of the word "UNIQUE".
- How many of them end with QUE?
 - How many of them begin with 'U' and end with 'E'?
 - How many of them begin with a consonant?
28. 3 fair coins are tossed simultaneously. Find the probability of
- getting one head
 - getting atmost one head
 - getting atleast two heads
29. A couple appears in an interview for two vacancies in the same post. The probability of husband getting selected is $\frac{1}{7}$ and the probability of wife getting selected is $\frac{1}{5}$. What is the probability that
- Both of them will be selected
 - Only one of them will be selected
 - None of them will be selected.
30. Expand $\left(x - \frac{1}{x^2}\right)^4$.
31. Resolve $\frac{x+2}{(x+4)(x+3)}$ into Partial fraction.
32. Write converse, inverse and contrapositive of "If I work hard then I get the grade."
33. 3 carpenters can earn Rs.360 in 6 days working 9 hours a day. How much will 8 carpenters earn in 12 days working 6 hours a day?
34. Two taps can separately fill a tank in 12 min and 15 min respectively. The tank when full can be emptied by a drain pipe in 20 min. When the tank was empty all the three were opened simultaneously. In what time will the tank be filled up?
35. A man invests equal sums of money in 4%, 5% and 6% stock, each stock being at par. If the total income of the man is Rs.3600. Find his total investment.
36. The price of washing machine inclusive of sales tax is Rs.13530. If the sales tax is 10%. Find the basic price.
37. If $A + B + C = 180^\circ$ Prove that $\cot B \cot C + \cot C \cot A + \cot A \cot B = 1$
38. Find the equation of the circle passing through the origin and making positive intercepts 3 and 5 on the co-ordinate axes.

IV. Answer the following questions.**6X5=30M**

39. Find the number of permutations of the letters of the word ENGINEERING. How many of these.
- begin with E and end with E
 - have all the 3E's together.
 - begin with GIN and end with GRIN
 - all the vowels are not together
 - no two vowels are together

40. Evaluate $(\sqrt{3} + 1)^5 - (\sqrt{3} - 1)^5$ using Binomial Theorem.
41. Resolve $\frac{x^3 - 2}{x(x + 1)^2}$ into Partial Fraction.
42. Verify whether the compound proposition $p \rightarrow (\sim p \vee q)$ is a tautology or a contradiction or neither.
43. Distribute Rs.632 amongst A,B and C in such a way that B will get 20% more than A and C gets 20% less than B.
44. A bill of Rs.5000 drawn on 10-4-1998 at 3 months was discounted on 1-5-1998 at 12% p.a.For what sum was the bill discounted and how much has the banker gained in this?
45. An engineering company has 80% learning effect and spends 1000 hours to produce 1 lot of the product.Estimate the labour cost of producing 8 lots of the product if the labour cost is Rs.40 per hour.
46. Solve the LPP graphically
Maximize $Z = 6x + 8y$
Subject to $x + y \leq 400$
 $2x + y \leq 600$ for $x, y \geq 0$
47. A person at the top of the hill observes that the angel of depression of two consecutive kilometer stones on the road leading to the foot of the hill and in the same vertical plain containing the position of the observer are 30° and 60° . find the height of the hill.
48. Prove that $\frac{\cos 7x + \cos 3x - \cos 5x - \cos x}{\sin 7x - \sin 3x - \sin 5x + \sin x} = \cot 2x$

V. Answer the following questions.

1X10=10M

- 49.
- a) Transport corporation operates bus service between two villages.Data regarding the passenger traffic during the first three days of the week is given below along with the total revenue:
- | Day | Number of passengers travelled | | | Total revenue(Rs) |
|-----|--------------------------------|----------------|-------|-------------------|
| | Children | Senior citizen | Adult | |
| 1 | 10 | 10 | 20 | 90 |
| 2 | 30 | 20 | 10 | 100 |
| 3 | 10 | 20 | 30 | 140 |
- Find the bus fare charged per children,per senior citizen and per adult by using matrix method.
- b) Find the value of $(0.99)^4$ using Binomial theorem upto 4 decimal places.
- 50.
- a) Find the equation of the circle passing through the point $(0,5)$ and $(6,1)$ and has its centre on the line $12x + 5y = 25$.
- b) Vishal consumes two types of food,A and B everyday to obtain minimum 8 units of protein,12units carbohydrates and 9 units of fat which is his daily requirements.1kg of food A contains 2,6 and 1 units of protein,carbohydrates and fat respectively.1kg of food B contains 1,1 and 3 units of protein,carbohydrates and fat respectively.Food A cost Rs.8 per kg and food B cost Rs.5 per kg. Form an LPP to find many kilograms of each food should he buy daily to minimize his cost of food and still meet minimal nutritional requirements.



I. Answer all the following questions

10x1=10M

1. If $A = \begin{bmatrix} -1 & 0 & 5 \\ 3 & 2 & -1 \end{bmatrix}$ find $2A^t$
2. In how many ways can 10 different precious stones be set to form necklace.
3. A bag contains 6 white beads and 4 red beads. A bead is drawn at random, what is the probability that the drawn bead is white.
4. Negate the proposition $p \rightarrow \sim q$
5. Find the 4th proportion of 6,12,15
6. A bill drawn for 3 months was legally due on 5-08-2019.find the draw date of the bill.
7. What is the rate of interest obtained by investing in 9% stock @ 180.
8. Write the formula of learning index
9. Find the value of $\sin 75^\circ$
10. Find the equation of the circle whose center is at (0,0) and radius is 4 units.

II. ANSWER THE FOLLOWING QUESTIONS

10X2=20

11. If $A = \begin{bmatrix} 2 & -1 \\ -3 & 1 \\ 4 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 1 & -6 \\ 4 & 2 & -5 \end{bmatrix}$, find BA
12. Solve by crammers' rule $2x+y=1$ and $x-3y=4$.
13. If ${}^n P_3 : {}^n P_2 = 3 : 1$, find n
14. Find the number of diagonals in a decagon.
15. Two dice are rolled simultaneously, find the probability of getting a doublet of even numbers.
16. If $(\sim p \vee q) \wedge \sim r$ is false proposition, find the truth value of p,q,and r.
17. Find the ratio between two numbers such that their sum is 40 and difference is 8.
18. A banker discounts a bill for a certain amount having 73 days to run before the bill matures at 15% P.a the discount value of the bill is Rs.976. What is the face value of the bill?
19. What is the market value of 9.5%stock when an investment of Rs.12400 produces an income of Rs.1472.5
20. Chandana purchases an article for Rs.5400 which includes 10% rebate of the market price and 20% sales tax on the remaining price .find the market price of the article?
21. The angle of elevation of the top of the chimney at a distance of 100 mts from a foot is 30° . Find the height?
22. Show that: $\frac{\cos 2A}{\sec A} - \frac{\sin 2A}{\cos ecA} = \cos 3A$
23. If $\tan A = \frac{3}{4}$, find $\tan 3A$
24. Find K, if the radius of the circle $x^2+y^2+4x-2y-k=0$ is 4 units.

III. ANSWER THE FOLLOWING QUESTIONS

10X3=30

25. If $A = \begin{bmatrix} 3 & 1 \\ 4 & 5 \end{bmatrix}$, prove that $A \cdot \text{adj}A = \text{adj}A \cdot A = |A|I$
26. Solve for x:(using properties) $\begin{vmatrix} 3x-8 & 3 & 3 \\ 3 & 3x-8 & 3 \\ 3 & 3 & 3x-8 \end{vmatrix} = 0$
27. How many 5 digit even numbers can be formed using the digits 0,1,2,3,4,5.
28. There are 20 girls and 60 boys in a class, half of girls and half of boys are first class students. A student is selected at random. What is the probability that the student is either a boy or a first class student?

29. A fair die is rolled twice, what is the probability of getting a sum of 8, when it is known that the first number is prime.
30. Find the 7 term in $\left(3x^2 - \frac{y}{3}\right)^9$
31. Resolve into partial fraction $\frac{8x+11}{(x+4)(x+3)}$
32. Write the converse, inverse and contrapositive of "if I get a seat then I will watch a cinema and have fun".
33. How much must be invested in 14.25% stock at 98 to produce the same income as would be obtained by investing Rs.9975 in 15% stock at 105
34. The monthly income of A and B are in the ratio 9:7 and those of B and C are in the ratio 3:2. If 10% of A's income and 15% of C's income differ by Rs.18. find the income of A, B and C.
35. An article is sold at 40% gain at the CP. Find the ratio of SP and CP.
36. A person purchases
- A rain coat for Rs.300 @ sales tax of 10%
 - Pair of shoe for RS.460 @ sales tax of 9%
 - Food for Rs.450 @ 5% salestax
 - Cloth for RS.800 @ 1% sales tax, what is the total amount of the bill.

37. Prove that $\tan 3A = \frac{3 \tan A - \tan^3 A}{1 - 3 \tan^2 A}$

38. Show that the line $3x-4y+6=0$ touches the circle $x^2+y^2-6x+10y-15=0$

IV. ANSWER THE FOLLOWING QUESTION

6X5=30

39. A team of 11 has to be chosen out of 16 players of who, 4 are bowlers and 2 are wicket keeper. in how many ways can a team be chosen, so that
- a. There are exactly 3 bowlers and 1 wicket keeper.
 - b. There are atleast 3 bowlers and one wicket keeper.
40. Find the term independent of x in $\left(\sqrt{x} + \frac{1}{3x^2}\right)^{10}$
41. Resolve into partial fraction: $\frac{8x+9}{(2+x)^2(x-4)}$
42. Prove that $[(\sim p \wedge q) \wedge (q \wedge r)] \wedge \sim q$ is a contradiction.
43. A can do a piece of work in 20 days, B in 30 days and C in 60 days. all of them began together. However, A left the job after 6 days and B quit the work 6 days before the completion of work. How many days did the work last.
44. A bill for Rs.14600 drawn at 3 months after date was discounted on 11-11-99 for Rs.14320. if the Discount rate is 20% p.a. on what date was the bill drawn?
45. An engineering company has 90% learning effect and spends 500 hours for the prototype. Estimate the labour cost of producing 7 engines of new order, if the labour cost is Rs.30 per hour.
46. Solve graphically: maximize $z=8x-2y$
- $$x + 2y \leq 120$$
- $$x + y \geq 60$$
- $$x + 2y \geq 80$$
- for $x \geq 0$ and $y \geq 0$
47. The angle of depression of 2 boats as observed from the mast head of a ship 50 mts high are 45° and 30° . what is the distance between the two boats if they are on the same side of the mast head in line with it?
48. Prove that: $\cos 10^\circ \cdot \cos 30^\circ \cdot \cos 50^\circ \cdot \cos 70^\circ = 3/16$

V. ANSWER THE FOLLOWING QUESTION

10X1=10

49.

- a. A school wants to award its students for the value of punctuality, good behaviour and hard work with a total cash price of 6000. Three times the award money for hard work added to that given to punctuality amounts to 11,000. the award money for punctuality and hard work together is double the amount given for good behaviour. Represent the system algebraically and solve using Matrix method.

- b. Simplify :

$$(1 + \sqrt{5})^5 - (1 - \sqrt{5})^5$$

50.

- a. Prove that the points (1,0)(2,-7)(8,1) and (9,-6) are concyclic points.
- b. Nikhil pesticide company must produce 200 KG mixture consisting of Chemical A and B daily. A cost Rs.3 / KG B cost Rs.8/KG . Maximum 80 Kg of chemical A must be used, 60 Kg of chemical B Must be used . formulate the LPP to minimize the cost.
