

MODEL QUESTION PAPER-1

For Reduced Syllabus 2020-21

MATHEMATICS : FIRST PUC

Subject code: 35

Time: 3 hours 15 minute

Max. Marks: 100

Instructions:

- The question paper has five parts namely A, B, C, D and E. Answer all the parts.
- Use the graph sheet for the question on linear programming in **PART – E**.

PART-A

I. Answer all the following questions:

10×1=10

- Write the set $\{x : x \in R, -4 < x \leq 6\}$ as an interval.
- If $P = \{a, b, c\}$ and $Q = \{r\}$, form the set $P \times Q$.
- Convert 300° into radian measure.
- Find the multiplicative inverse of the complex number $1+i$.
- Solve: $5x-3 < 7$, when x is an integer.
- If ${}^n C_8 = {}^n C_2$, find the value of n .
- Find the geometric mean of the numbers 2 and 8.
- Find the slope of the line passing through the points $(3, -2)$ and $(7, -2)$.
- Evaluate: $\lim_{x \rightarrow \frac{\pi}{4}} \sin 2x$.
- Define sample space of a random experiment.

PART-B

II. Answer any TEN of the following questions:

10×2=20

- Write the power set of the set $A = \{1, 2, 3\}$.
- Let $A = \{a, b\}$ and $B = \{a, b, c\}$. Is $A \subset B$? What is $A \cup B$?
- 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 .
- A wheel makes 360 revolutions in one minute. Through how many radians it turns in one second.
- Prove that $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} - \tan^2 \frac{\pi}{4} = -\frac{1}{2}$.
- Express the complex number $(3 + 5i)(2 + 6i)$ in the form $a + ib$.
- Solve: $7x + 3 \leq 5x + 9$. Show the graph of the solution on the number line.
- In how many ways can the letters of the word PERMUTATIONS be arranged if the

vowels are all together.

19. Find the distance between the lines $3x-4y+7=0$ and $3x-4y+5=0$.
20. Find the equation of the line perpendicular to the line $x-2y+3=0$ and passing through the point $(1,-2)$.
21. If $(1,1)$ is the centroid of the triangle with $(3,-5,7)$ and $(-1,7,-6)$ as the two vertices, find the third vertex.
22. Evaluate: $\lim_{x \rightarrow 2} \frac{\frac{1}{x} + \frac{1}{2}}{x+2}$.
23. The mean of the six observations 5, 15, 25, 35, 45, 55 is 30, find its variance.
24. A coin is tossed twice, what is the probability that atleast one tail occurs?

PART-C

III. Answer any TEN of the following questions:

$10 \times 3 = 30$

25. In a class of 35 students, 24 likes to play cricket and 16 likes to play football, also each student likes to play at least one of the games. How many students like to play both cricket and football?
26. Let $A = \{1, 2, 3, \dots, 14\}$. Define a relation R from A to A by $R = \{(x, y) : 3x - y = 0 \text{ and } x, y \in A\}$. Write down its domain and range.
27. Prove that $\cos\left(\frac{3\pi}{4} + x\right) + \cos\left(\frac{3\pi}{4} - x\right) = -\sqrt{2} \sin x$.
28. Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$.
29. Solve the equation $3x^2 - 4x + \frac{20}{3} = 0$.
30. Find all pairs of consecutive even positive integers, both of which are larger than 5 such that their sum is less than 23.
31. If ${}^n P_5 = 42 {}^n P_3$, $n > 4$. Find n .
32. How many terms of the A.P. $-6, -\frac{11}{2}, -5, \dots$ are needed to give the sum -25?
33. In an A.P., if m^{th} term is n and the n^{th} term is m , where $m \neq n$, find the p^{th} term.
34. Evaluate: $\lim_{x \rightarrow 2} \frac{3x^2 - x - 10}{x^2 - 4}$.
35. Find the derivative of $y = x^4(5 \sin x - 3 \cos x)$.
36. Find the mean deviation about median for the following data:
3, 9, 5, 3, 12, 10, 18, 4, 7, 19, 21.

37. A fair coin with 1 marked on one face and 6 on the other and a fair die are both tossed. Find the probability that the sum of numbers that turn up is (i) 3 (ii) 12.
38. A and B are events such that $P(A) = 0.42$, $P(B) = 0.48$ and $P(A \text{ and } B) = 0.16$. Determine i) $P(\text{not } A)$ ii) $P(\text{not } B)$ and iii) $P(A \text{ or } B)$.

PART-D

IV. Answer any SIX of the following questions:

6×5=30

39. Define Modulus function. Draw the graph of Modulus function and write its domain and range.
40. Prove that $\frac{\sin 7x + \sin 5x + \sin 9x + \sin 3x}{\cos 7x + \cos 5x + \cos 9x + \cos 3x} = \tan 6x$.
41. Find $\cos \frac{x}{2}$ and $\tan \frac{x}{2}$, if $\tan x = \frac{3}{4}$, $\pi < x < \frac{3\pi}{2}$.
42. Solve the following system of inequalities graphically:
 $3x + 2y \leq 150$, $x + 4y \leq 80$, $x \leq 15$, $x \geq 0$, $y \geq 0$.
43. A committee of 7 is to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of (i) exactly 3 girls? (ii) at least 3 girls?
44. Find the equation of the line through the point (2,2) and cutting off the intercepts on the axes whose sum is 9.
45. Derive a formula to find the perpendicular distance of a point $P(x_1, y_1)$ from the line $Ax + By + C = 0$.
46. Derive a formula for finding the distance between two points $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ and hence, find the distance between the points $P(2,3,1)$ and $Q(-1,3,-5)$.
47. Find the derivative of $\tan x$ from first principles.
48. Find the mean deviation about the mean for the following data:

Height in cm	95 -105	105-115	115-125	125-135	135-145	145-155
Number of boys	9	13	26	30	12	10

PART-E

V. Answer any ONE of the following questions:

1×10=10

49. a) Prove geometrically that $\cos(x+y) = \cos x \cos y - \sin x \sin y$ and hence find $\cos\left(\frac{\pi}{2} + x\right)$.
- b) Differentiate $\frac{x + \cos x}{\tan x}$ with respect to x .
50. a) Prove that $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$, (where x is in radian measure) and hence evaluate $\lim_{x \rightarrow 0} \frac{\sin ax}{bx}$.
- b) Find a geometric progression for which the sum of the first two terms is -4 and the fifth term is 4 times the third term.

MODEL QUESTION PAPER-2

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Instructions:

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PART-A

ANSWER ALL THE QUESTIONS

10X1=10

- Write the set $\{1,4,9, \dots \dots \dots 100\}$ in the set builder form.
- Write the range of the function $f(x) = -|x|$, where $x \in R$.
- Convert $\left(-\frac{5\pi}{3}\right)^c$ into degrees.
- Find the conjugate of $\sqrt{3}i - 1$.
- Solve, $-12x > 30$, when x is a natural number.
- Find $\frac{7!}{5!}$.
- The arithmetic mean of 4 and another number is 10. Find the other number.
- Find the distance of the point $(3, -5)$ from the line $3x - 4y - 26 = 0$.
- Find $\lim_{z \rightarrow 1} \frac{z^{\frac{1}{3}} - 1}{z^{\frac{1}{6}} - 1}$.
- If $\frac{2}{11}$ is the probability of an event A then what is the probability of the event 'not A'?

PART-B

ANSWER ANY TEN QUESTIONS

10X2=20

- If $U = \{x : x \leq 10, x \in N\}$ the Universal set, $A = \{x : x \in N, x \text{ is prime}\}$ and $B = \{x : x \in N, x \text{ is even}\}$, write $A \cap B$ in roster form.
- If X and Y are two sets such that $X \cup Y$ has 50 elements, X has 28 elements and Y has 32 elements. How many elements does $X \cap Y$ have?
- If $A \times B = \{(a, x), (a, y), (b, x), (b, y)\}$. Find A and B.
- In a circle of diameter 40cm, the length of a chord is 20cm. Find the length of the minor arc of the chord.
- Find the principal solutions of the equation $\sin x = \frac{\sqrt{3}}{2}$.
- If $\left(\frac{1+i}{1-i}\right)^m = 1$, then find the least positive integral value of m.
- Solve the inequality $(2x - 5) \geq (1 - 5x)$ and represent the solution graphically on the number line.
- How many 4-digit numbers are there with no digit repeated?

19. Find the equation of the line passing through $(-4,3)$ with slope $\left(\frac{1}{2}\right)$.
20. Write the equation of the line for which $\tan \theta = \frac{1}{2}$, where θ is the inclination of the line and x intercept is 4.
21. Find the octants in which the points $(1,2,3)$ and $(4,-2, -5)$ lie.
22. Find $\lim_{x \rightarrow 2} \left[\frac{x^3 - 4x^2 + 4x}{x^2 - 4} \right]$.
23. Find the median of the the data 36,72,46,42,60,45,53,46,51,49.
24. A card is selected from a pack of 52 parts calculate the probability that the card is
i) an Ace ii) a Black card.

PART-C

ANSWER ANY TEN QUESTIONS

10x3=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 and orange juices. Find how many students were taking neither apple juice nor orange juice.
26. Let $f = \{(1,1), (2,3), (0,-1), (-1,-3)\}$ be a function from Z to Z defined by $f(x) = ax + b$.
Determine a and b.
27. Prove that $\frac{\cos(\pi + x)\cos(-x)}{\sin(\pi - x)\cos\left(\frac{\pi}{2} + x\right)} = \cot^2 x$.
28. Solve the equation $x^2 - 2x + \frac{3}{2} = 0$.
29. If $x + iy = \sqrt{\frac{a+ib}{c+id}}$ prove that $(x^2 + y^2)^2 = \frac{a^2 + b^2}{c^2 + d^2}$.
30. Ravi obtained 70 and 75 marks in first two unit tests. Find the minimum marks he should get in the third test to have an average of at least 60 marks.
31. If ${}^5P_r = 6 \cdot {}^5P_{r-1}$ then find r.
32. Insert 3 arithmetic means between 8 and 24.
33. If the sum of n terms of an A.P. is $3n^2 + 5n$ and its mth term is 164, find the value of m.
34. Evaluate $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\tan 2x}{x - \frac{\pi}{2}}$.
35. Find the derivative of $(5x^3 + 3x - 1)(x - 1)$ with respect to x .
36. The mean and standard deviation of 20 observations are found to be 10 and 2 respectively. On rechecking it was found that an observation 8 was incorrect. Calculate the correct mean if wrong item is omitted.
37. A bag contains 9 discs of which 4 are red 3 are blue and 2 are yellow. The discs are similar in shape and size. The disc is drawn at random from the bag. Calculate the probability that will be (i)red (ii) no blue (iii) either red or blue.

38. A and B are events such that $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \text{ and } B) = \frac{1}{8}$.
Find (i) $P(A \text{ or } B)$ (ii) $P(\text{not } A \text{ and not } B)$.

PART-D

ANSWER ANY SIX QUESTIONS

6X5=30

39. Define Signum function. Draw the graph of it and write down its Domain and Range.
40. Prove that $\cos 6x = 32 \cos^6 x - 48 \cos^4 x + 18 \cos^2 x - 1$.
41. Prove that $\frac{\sin 5x - 2 \sin 3x + \sin x}{\cos 5x - \cos x} = \tan x$.
42. Solve the following system of linear inequalities graphically: $x + y \geq 5$, $x - y \leq 3$.
43. Find the number of ways of selecting 9 balls from 6 red balls, 5 white balls and 5 blue balls. If each selection consists of 3 balls of each colour.
44. Find the coordinates of the foot of the perpendicular from the point $(-1, 3)$ to the line $3x - 4y - 16 = 0$.
45. Derive an expression for the angle between two lines $y = m_1x + c_1$ and $y = m_2x + c_2$ and hence find the angle between the lines $\sqrt{3}x + y = 1$ and $x + \sqrt{3}y = 1$.
46. Derive an expression for the coordinates of a point which divides the line joining the points $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ internally in the ratio $m:n$.
47. Differentiate $\frac{1}{x}$ with respect to x from first principles.
48. Find the mean deviation about the median for the following data

Marks Obtained	0-10	10-20	20-30	30-40	40-50	50-60
Number of girls	6	8	14	16	4	2

PART -E

ANSWER ANY ONE QUESTION:

01x10=10

- 49 a) Prove geometrically $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$, where x is in radian and hence evaluate $\lim_{x \rightarrow 0} \frac{\sin 4x}{\sin 2x}$ (6)
- b) Differentiate $\frac{x^5 - \cos x}{\sin x}$ with respect to x . (4)
- 50 a) Prove geometrically that $\cos(x + y) = \cos x \cos y - \sin x \sin y$ and hence show that $\cos 2x = \cos^2 x - \sin^2 x$. (6)
- b) The sum of first three terms of a G.P. is $\frac{13}{12}$ and their product is -1 .
Find the common ratio and the terms. (4)
