

MODEL QUESTION PAPER-2

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

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 ${}^4P_r = 6 \cdot {}^5P_{r-1}$ 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 m^{th} 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)
