

# PUC I YEAR MATHEMATICS

**AS PER NEW PATTERN 2023-2024**

**BASED ON FIRST PUC MODEL QUESTION PAPER  
SUBJECT : MATHEMATICS (35)**

**5 SET OF  
NEW PATTERN  
QUESTION PAPERS**

By,.

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TOP SCORER POCKET MARKS PACKAGE**PRACTICE QUESTION PAPER - 01****AS PER NEW PATTERN 2023-2024****BASED ON FIRST PUC MODEL QUESTION PAPER****SUBJECT : MATHEMATICS (35)****Time: 3 Hrs 15 Min****[ TOTAL QUESTIONS : 52 ]****Max Marks: 80**

Instructions: (1) The question paper has five Parts namely A, B, C, D and E. Answer all the parts.

(2) Part-A has 15 multiple choice questions, 5 fill in the blanks questions

**PART-A****I. Answer all the multiple choice questions :****(15 × 1 = 15)**

- The set  $A = \{x : x \text{ is a natural number less than } 6\}$ , in roster form is
  - $A = \{0,1,2,3,4,5\}$ .
  - $A = \{0,1,2,3,4,5,6\}$
  - $A = \{1,2,3,4,5\}$
  - $A = \{\dots - 2, -1, 0,1,2,3,4,5\}$
- If  $\left(\frac{x+1}{2}, 7\right) = (6,7)$  then x is
  - 13
  - 12
  - 7
  - 11
- The value of  $\cos\left(\frac{\pi}{4} - x\right)\cos\left(\frac{\pi}{4} - y\right) - \sin\left(\frac{\pi}{4} - x\right)\sin\left(\frac{\pi}{4} - y\right)$  is
  - $\sin(x + y)$
  - $\cos(x + y)$
  - $-\sin(x + y)$
  - $-\cos(x + y)$
- The value of  $i^9 + i^{19}$  is
  - 1
  - 1
  - 2
  - 0
- If  $-12x > 30$  when x is a natural number is
  - $x < 2.5$
  - $x < -2.5$
  - $x < 0$
  - None of these
- If  ${}^n C_7 = {}^n C_6$  then n is
  - 13
  - 7
  - 6
  - does not exist
- If  $(1 - 2x)^5$  then the number of terms in this expansion is
  - 5
  - 4
  - 10
  - 6
- The first term of the sequence  $a_n = \frac{n}{n+1}$  is
  - $\frac{1}{3}$
  - $\frac{2}{3}$
  - $\frac{1}{3}$
  - $\frac{1}{2}$

9. Slope of line  $3x - 4y + 10 = 0$  is  
 a)  $1/4$  b)  $1/2$   
 c)  $3/4$  d)  $1$
10. The radius of circle  $(x + 5)^2 + (y - 3)^2 = 36$  is  
 a)  $36$  b)  $6$   
 c)  $5$  d)  $3$
11. Length of major axis of ellipse  $\frac{x^2}{49} + \frac{y^2}{36} = 1$  is  
 a)  $49$ , b)  $36$ ,  
 c)  $12$ , d)  $14$ ,
12. The Octant the points  $(1,2,3)$  is lies is  
 a) I, b) II,  
 c) III, d) IV,
13. The derivative of  $x^3 - 27$  w.r.t  $x$  at  $x=2$   
 a)  $8$  b)  $2$   
 c)  $12$  d)  $0$
14. The median of the data :  $3,9,5,3,12,10,18,4, 7, 19, 21$  is  
 a)  $18$  b)  $9$   
 c)  $12$  d)  $10$
15. If  $P(A) = \frac{2}{11}$  is the probability of an event A, the probability of the event not A is  
 a)  $2/11$  b)  $9/11$   
 c)  $0.5$  d)  $1$

**II.Fill in the blanks by choosing the appropriate answer from those give in the bracket : (5 × 1 = 5)**  
 (5, 9, 6, not defined, -1)

16. If  $A = \{1,3,5\}$  and  $B = \{2,4,6\}$  then the number of elements  $A \times B$  is .....
17. The value of  $\cos 3\pi$  is .....
18.  $3!$  is .....
19. The slope of the line Passing through the points  $(3, -2)$  and  $(3,4)$  is .....
20. The value of  $\lim_{x \rightarrow 3} [x(x + 1)]$  is .....

**PART-B**

**Answer any six questions : (6 × 2 = 12)**

21. If  $A = \{2,4,6,8\}$ ,  $B = \{1,2,4,8,16\}$  then find  $A \cup B$  and  $A \cap B$
22. List the all subsets of the set  $A = \{a, b, c\}$
23. Prove that  $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} - \tan^2 \frac{\pi}{4} = -\frac{1}{2}$
24. Find the multiplicative inverse of complex number  $4 - 3i$
25. Express complex number  $\frac{1+2i}{1-i}$  in the form of  $a + ib$
26. Solve  $3(x - 1) \leq 2(x - 3)$ . Show the graph of solution in number line.
27. How many 2 digit even numbers can be formed from the digits  $1,2,3,4,5$  if the digits can be repeated?
28. Expand :  $\left(x^2 + \frac{3}{x}\right)^4$ ,  $x \neq 0$
29. Find the equation of the line passing through the point  $(-2,3)$  with slope  $-4$ .
30. Evaluate :  $\lim_{x \rightarrow 3} \left(\frac{x-3}{x^2-5x+6}\right)$ ,
31. Consider the experiment of rolling a die. Describe the following events: Let A be the event 'getting a prime number', B be the event 'getting an odd number'.

## PART-C

Answer any six questions :

(6 × 3 = 18)

32. If  $U = \{1,2,3,4,5,6,7\}$ ,  $A = \{1,2,5,7\}$  and  $B = \{3,4,5,6\}$  then verify  $(A \cup B)' = A' \cap B'$
33. If  $f(x) = x^2$  and  $g(x) = 2x - 1$  then find  $f + g$ ,  $f - g$ ,  $fg$ ,  $f/g$ ,
34. If  $\cot x = -\frac{5}{12}$ ,  $x$  lies in second quadrant, find other five trigonometric functions
35. Prove that  $\cos\left(\frac{3\pi}{4} + x\right) - \cos\left(\frac{3\pi}{4} - x\right) = -\sqrt{2}\sin x$
36. If  $z_1 = 2 - i$  and  $z_2 = -2 - i$  then find  $Re\left(\frac{z_1 z_2}{z_1}\right)$
37. The marks obtained by a student of class XI in first and second terminal examination are 62 and 48, respectively. Find the minimum marks he should get in the annual examination to have an average of at least 60 marks.
38. If A.M and G.M of two positive numbers  $a$  and  $b$  are 10 and 8, respectively, find the numbers
39. Find the equation of the line perpendicular to the line  $x - 2y + 3 = 0$  and passing through  $(1, -2)$ .
40. Find the centre and radius of the circle  $x^2 + y^2 + 8x + 10y - 8 = 0$
41. Using distance formula, Show that the points  $(0,7,-10)$ ,  $(1,6,-6)$  and  $(4,9,-6)$  are the vertices of isosceles triangle
42. Find the derivative of  $\sin x$  with respect to  $x$  from first principle.

## PART-D

Answer any four questions :

(5 × 4 = 20)

43. Define modulus function. Draw the graph of modulus function, also write domain and range
44. Prove that  $\frac{\sin 5x - 2\sin 3x + \sin x}{\cos 5x - \cos x} = \tan x$
45. A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has  
(i) no girl ?  
(ii) at least one boy and one girl?  
(iii) at least 3 girls ?
46. State and prove Binomial Theorem for all natural number
47. Derive the equation of line having intercepts  $a$  and  $b$  on  $x$  and  $y$  axes respectively and hence find the equation of the line, which makes intercepts  $-3$  and  $2$  on the  $x$ - and  $y$ -axes respectively.
48. Prove that geometrically  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$  where  $x$  being measured in radian (Sandwich theorem)
49. Find the mean deviation about mean for the following data

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No of Students	2	3	8	14	8	3	2

50. A die is thrown, find the probability of following events:  
(i) A prime number will appear,  
(ii) A number greater than or equal to 3 will appear,  
(iii) A number more than 6 will appear,

## PART-E

Answer the following questions :

51. a) Define Ellipse as a set of all points in a plane and derive its equation in the form of  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

OR

- b) Prove that geometrically  $\cos(x + y) = \cos x \cdot \cos y - \sin x \cdot \sin y$

52. a) Find the sum of  $n$  terms of series :  $8, 88, 888, 8888, \dots$

(4M)

OR

- b) Find the derivative of  $\frac{2}{x+1} - \frac{x^2}{3x-1}$  w.r.t  $x$

TOP SCORER POCKET MARKS PACKAGE**PRACTICE QUESTION PAPER - 02****AS PER NEW PATTERN 2023-2024****BASED ON FIRST PUC MODEL QUESTION PAPER****SUBJECT : MATHEMATICS (35)****Time: 3 Hrs 15 Min****[ TOTAL QUESTIONS : 52 ]****Max Marks: 80**

Instructions: (1) The question paper has five Parts namely A, B, C, D and E. Answer all the parts.

(2) Part-A has 15 multiple choice questions, 5 fill in the blanks questions

**PART-A****I. Answer all the multiple choice questions :****(15 × 1 = 15)**

- Let  $A = \{ 1, 2, \{ 3, 4 \}, 5 \}$ . Which of the following statements are incorrect
  - $1 \in A$ .
  - $\{ 3, 4 \} \in A$
  - $\{ 3, 4 \} \subset A$
  - $2 \in A$  and  $\{1,5\} \subset A$
- If  $f(x) = 2x - 5$ , then  $f(-3)$  is
  - 6
  - 11
  - 16
  - 11
- $\sqrt{3}\operatorname{cosec}20^\circ - \sec20^\circ =$  is
  - 1
  - 2
  - 3
  - 4
- If  $z = 4 + i\left(\frac{-1}{11}\right)$  then  $\operatorname{Re}(z)$  is
  - $\frac{-1}{11}$
  - $\frac{1}{11}$
  - 4
  - 4
- If  $\frac{1}{5} < \frac{1}{3}$  then
  - $5 < 3$
  - $5 > 3$
  - $\frac{1}{5} > \frac{1}{3}$
  - $\frac{1}{3} < \frac{1}{5}$
- How many 2 digit even numbers can be formed from the digits 1,2,3,4,5 if the digits can be repeated?
  - 10
  - 25
  - 20
  - 2
- $C_0 + C_1 + C_2 + C_3 + \dots + C_n =$ 
  - 0
  - $2^{n-1}$
  - $2^{n-2}$
  - $2^n$
- If the arithmetic mean of 8 and x is 20 then the value of x is
  - 48
  - 32
  - 28
  - 12

9. The slope of the line, which makes an angle of  $30^\circ$  with the positive direction of y-axis measured anticlockwise. is

a)  $\sqrt{3}$

b)  $\frac{1}{\sqrt{3}}$

c)  $-\sqrt{3}$

d)  $-\frac{1}{\sqrt{3}}$

10. The coordinates of focus of the parabola  $y^2 = 8x$  is

a) (0,2)

b) (0, -2)

c) (2,0)

d) (-2,0)

11. Eccentricity of ellipse is always

a)  $e > 1$ ,

b)  $e < 1$ ,

c)  $e = 1$ ,

d)  $e = 2$ ,

12. The Octant the points (4, -2,3) is lies in

a) I,

b) II,

c) III,

d) IV,

13. The value of  $\lim_{x \rightarrow 0} \frac{\sin ax}{bx}$

a) 1

b)  $\frac{a}{b}$

c)  $\frac{b}{a}$

d) 0

14. The mean of the data 6,7,10,12,13,4,8,12 is

a) 100

b) 72

c) 8

d) 9

15. A die is thrown, the probability that prime number will appear, is

a)  $\frac{1}{2}$

b)  $\frac{2}{3}$

c)  $\frac{1}{3}$

d)  $\frac{3}{4}$

**II.Fill in the blanks by choosing the appropriate answer from those give in the bracket : (5 × 1 = 5)**

$$\left(2, -\frac{3}{2}, 64, 3, \sqrt{3}\right)$$

16. If  $(x + 1, 1) = (4, 1)$  then the value of x is .....

17. If  $\cos x = -\frac{1}{2}$ , x lies in third quadrant, then  $\tan x$  is .....

18. If  $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$  then the value of x is .....

19. The slope of the line  $\frac{x}{4} + \frac{y}{6} = 1$  is .....

20. The derivative of  $2x - \frac{3}{4}$  w.r.t x is .....

### PART-B

**Answer any six questions :**

**(6 × 2 = 12)**

21. If  $A = \{2, 4, 6, 8\}$  and  $B = \{6, 8, 10, 12\}$  then find  $A \cup B$  and  $A \cap B$

22. If  $X = \{a, b, c, d\}$  and  $Y = \{f, b, d, g\}$  then find  $(X - Y)$  and  $(Y - X)$

23. Prove that  $\frac{\tan(\frac{\pi}{4} + x)}{\tan(\frac{\pi}{4} - x)} = \left(\frac{1 + \tan x}{1 - \tan x}\right)^2$

24. Find the modulus of  $\frac{1 + 2i}{1 - 3i}$

25. Find the value of x and y if  $(x + 2y) + i(2x - 3y)$  is conjugate of  $5 + 4i$

26. Solve  $3(2 - x) \geq 2(1 - x)$ . Show the graph of solution in number line.

27. Find n if  ${}^n P_5 = 42 {}^n P_3$ ,  $n > 4$

28. Compute  $(101)^4$  by using binomial theorem.

29. Find the equation of the line Passing through the points  $(1, -1)$  and  $(3, 5)$ .

30. Evaluate :  $\lim_{x \rightarrow 0} \left( \frac{\sqrt{1+x}-1}{x} \right)$ .

31. A die is thrown. Describe the following events: Let the events are  
A: a number less than 7, B: a multiple of 3,

**PART-C**

Answer any six questions :

(6 × 3 = 18)

32. If  $U = \{1,2,3,4,5,6,7,8,9\}$ ,  $A = \{2,4,6,8\}$  and  $B = \{2,3,5,7\}$  then verify  $(A \cap B)' = A' \cup B'$

33. Let  $A = \{1,2,3, \dots, 14\}$  define the relation R from A to A given by

$$R = \{(x, y) : 3x - y = 0, \text{ where } x, y \in A\}$$
 then write domain, co-domain and range

34. Prove that  $\sin 3x = 3\sin x - 4\sin^3 x$

35. If arcs of same length in two circles subtended angles  $65^\circ$  and  $110^\circ$  at the centre. Find ratio of their radii

36. Express complex number  $\frac{(3+i\sqrt{5})(3-i\sqrt{5})}{(\sqrt{3}+i\sqrt{2})-(\sqrt{3}-i\sqrt{2})}$  in the form of  $a + ib$

37. Ravi obtained 70 and 75 marks in first two unit test. Find the minimum marks he should get in the third test to have an average of at least 60 marks.

38. Insert 5 numbers between 8 and 26 such that resulting sequence is an A.P

39. Find equation of the line parallel to the line  $3x - 4y + 2 = 0$  and passing through the point  $(-2, 3)$

40. Find the equation of ellipse whose centre at origin, major axis on the y axis and passing through the point  $(3, 2)$  and  $(1, 6)$

41. Find the set of equation of points which are equidistance from the points  $(1, 2, 3)$  and  $(3, 2, -1)$ .

42. Find the derivative of  $x^2$  with respect to x from first principle

**PART-D**

Answer any four questions :

(5 × 4 = 20)

43. Define signum function. Draw the graph of signum function, also write its domain and range

44. Prove that  $\cos^2 x + \cos^2 \left( x + \frac{\pi}{3} \right) + \cos^2 \left( x - \frac{\pi}{3} \right) = \frac{3}{2}$

45. What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these  
(i) four cards are of the same suit, (ii) four cards belong to four different suits,  
(iii) are face cards, (iv) two are red cards and two are black cards, (v) cards are of the same colour?

46. For all a, b real numbers and n is a positive integer then prove that

$$(a + b)^n = {}^n C_0 a^n + {}^n C_1 a^{n-1} b + {}^n C_2 a^{n-2} b^2 + \dots + {}^n C_n b^n$$

47. Derive the equation of line with slope  $m$  and y-intercept is  $c$  and hence Find the equation of line with slope  $\frac{1}{2}$  and y-intercept  $-\frac{3}{2}$

48. Prove that geometrically  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$  where x being measured in radian (Sandwich theorem) m

49. Find the mean deviation about median for the following data

Class	00-10	10-20	20-30	30-40	40-50	50-60
Frequency	6	7	15	16	4	2

50. Three coins are tossed once. Find the probability of getting (i) 3 heads, (ii) 2 heads, (iii) no head,

**PART-E**

Answer the following questions :

51. a) Prove that geometrically  $\cos(x + y) = \cos x \cdot \cos y - \sin x \cdot \sin y$

OR

b) Define Hyperbola as a set of all points in a plane and derive its equation in the form of  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

52. b) Find the sum of n terms of series : 0.6, 0.66, 0.666, 0.6666, ...

(4M)

OR

b) Find the derivative of  $\frac{3\sin x - x^5}{4\cos x + 1}$  w.r.t x

TOP SCORER POCKET MARKS PACKAGE**PRACTICE QUESTION PAPER - 03****AS PER NEW PATTERN 2023-2024****BASED ON FIRST PUC MODEL QUESTION PAPER****SUBJECT : MATHEMATICS (35)****Time: 3 Hrs 15 Min****[ TOTAL QUESTIONS : 52 ]****Max Marks: 80**

Instructions: (1) The question paper has five Parts namely A, B, C, D and E. Answer all the parts.

(2) Part-A has 15 multiple choice questions, 5 fill in the blanks questions

**PART-A****I. Answer all the multiple choice questions :****(15 × 1 = 15)**

- $A \cap A'$  is
  - $A$ .
  - $A'$ .
  - $U$ .
  - $\Phi$ .
- The function 't' which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by  $t(C) = \frac{9C}{5} + 32$  then  $t(0)$  is
  - $\frac{9}{5}$
  - 32
  - 32
  - 0
- The value of  $\sin(n+1)x \cdot \sin(n+2)x + \cos(n+1)x \cdot \cos(n+2)x$  is
  - $\sin x$
  - $\cos x$
  - $-\sin x$
  - $-\cos x$
- $a + ib$  form of  $i^{-35}$ 
  - $0 + i$
  - $0 - i$
  - $1 - 0i$
  - $1 + 0i$
- If  $-a > b$  then
  - $a < -b$
  - $-a < -b$
  - $a < b$
  - None of these
- If  $\frac{1}{8!} + \frac{1}{9!} = \frac{x}{10!}$  then the value of x is
  - 64
  - 81
  - 100
  - $10 \times 9 \times 8$
- If  $(a - b)^4$  then the number of terms in this expansion is
  - 5
  - 4
  - 10
  - 6
- The third term of the sequence if  $a_1 = a_2 = 2$ ,  $a_n = a_{n-1} - 2$  for all  $n > 2$ 
  - 2
  - 2
  - 4
  - 0



9. The equation of y-axis is  
 a)  $x = 0$  b)  $y = 0$   
 c)  $xy = 0$  d)  $x = y$
10. The length of latus rectum of the parabola  $x^2 = -16y$  is  
 a) 4 b) 8  
 c) 16 d) 32
11. Length of minor axis of  $\frac{x^2}{49} + \frac{y^2}{36} = 1$  is  
 a) 49, b) 36,  
 c) 12, d) 14,
12. Name the plane which is y axis and z axis taken together  
 a) XY-plane, b) YZ-plane,  
 c) ZX-plane, d) none of these,
13. The derivative of  $y = x \sin x$   
 a)  $x + \cos x$  b)  $x + \sin x$   
 c)  $x \cos x + \sin x$  d)  $x \cos x - \sin x$
14. Variance for ungrouped data is 16 then the value of standard deviation is  
 a) 4 b) 256  
 c) 32 d) 64
15. A coin is tossed twice, then the probability that atleast one tail occurs is  
 a)  $\frac{1}{4}$  b)  $\frac{1}{2}$   
 c)  $\frac{3}{4}$  d)  $\frac{1}{3}$

**II.Fill in the blanks by choosing the appropriate answer from those give in the bracket : (5 × 1 = 5)**

$$\left(-\frac{19\pi}{72}, 2, 1, \frac{2}{101}, \frac{4}{9}\right)$$

16. If  $A = \{1,2\}$  and  $B = \{x : x \in N \text{ and } x^2 - 9 = 0\}$  then the number of elements  $A \times B$  is .....
17. If  $\theta = -47^\circ 30'$  then radian measure is .....
18. If  ${}^n C_9 = {}^n C_8$  then  ${}^n C_{17}$  is .....
19. The slope of the line Passing through the points (5,6) and (-4,2) is .....
20. The value of  $\lim_{x \rightarrow 1} \left(\frac{x^2+1}{x+100}\right)$  is .....

**PART-B**

**Answer any six questions :**

**(6 × 2 = 12)**

21. If  $A = \{a, e, i, o, u\}$ ,  $B = \{a, i, u\}$  then find  $A \cup B$  and  $A \cap B$
22. Draw the appropriate Venn diagram for  $A - B$
23. Prove that  $\cot^2 \frac{\pi}{6} + \operatorname{cosec} \frac{5\pi}{6} + 3 \tan^2 \frac{\pi}{6} = 6$
24. Find the value of x and y if  $(x - iy)(3 + 5i)$  is conjugate of  $-6 - 24i$
25. Find the multiplicative inverse of complex number  $\sqrt{5} + 3i$
26. Solve  $5x - 3 \geq 3x - 5$ . Show the graph of solution in number line.
27. A bag contains 5 black and 6 red balls. Determine the number of ways in which 2 black and 3 red balls can be selected.
28. Expand :  $\left(x + \frac{1}{x}\right)^6$ ,  $x \neq 0$
29. Reduce the equation  $6x + 3y - 5 = 0$  into slope - intercept form, find slope and the y-intercept.
30. Evaluate :  $\lim_{z \rightarrow 1} \left(\frac{z^{1/3}-1}{z^{1/6}-1}\right)$

31. A coin is tossed three times, Describe the following events: Let  
A: 'No head appears', B: 'Exactly one head appears'

**PART-C**

**Answer any six questions :**

**(6 × 3 = 18)**

32. Taking the set of natural numbers as the universal set. If  $A = \{x : x \in N \text{ and } 2x + 1 > 10\}$  and  $B = \{x : x \in N \text{ and } 3x + 1 > 8\}$ . Find  $A'$  and  $B'$
33. If  $f(x) = x + 1$  and  $g(x) = 2x + 3$  then find  $f + g, f - g, fg, f/g,$
34. If  $\sin x = \frac{3}{5}$ ,  $x$  lies in second quadrant, find other five trigonometric functions
35. Prove that  $\tan 3x = \frac{3\tan x - \tan^3 x}{1 - 3\tan^2 x}$
36. If  $(x + iy)^3 = u + iv$  then show that  $\frac{u}{x} + \frac{v}{y} = 4(x^2 - y^2)$
37. Find all pairs of consecutive even positive integers, both of which are larger than 5, such that their sum is less than 23.
38. Sum of first three terms of a G.P is  $\frac{39}{10}$  and their product is 1 find the common ratio and terms
39. Find the equation of the line perpendicular to the line  $x - 7y + 5 = 0$  and having  $x$  intercept 3.
40. Find the coordinates of focus, axis, equation of directrix and length of latus rectum of the parabola  $y^2 = 8x$
41. Using distance formula, Show that the points  $(-2,3,5), (1,2,3)$  and  $(7,0,-1)$  are collinear
42. Find the derivative of  $\tan x$  with respect to  $x$  from first principle

**PART-D**

**Answer any four questions :**

**(5 × 4 = 20)**

43. Define greatest integer function. Draw the graph of it, also write its domain and range
44. Prove that  $\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$
45. How many words, with or without meaning can be made from the letters of the word MONDAY, assuming that no letter is repeated, if.  
(i) 4 letters are used at a time, (ii) all letters are used at a time,  
(iii) all letters are used but first letter is a vowel?
46. State and prove Binomial Theorem for all natural number
47. Derive the formula for distance of a point  $(x_1, y_1)$  from the line  $Ax + By + C = 0$  geometrically
48. Prove that geometrically  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$  where  $x$  being measured in radian (Sandwich theorem)
49. Find the mean deviation about mean for the following data

$x_i$	5	10	15	20	25
$f_i$	7	4	6	3	5

50. One card is drawn from a well shuffled deck of 52 cards. If each out come is equally likely, calculate the probability that the card will be (i) a diamond (ii) not an ace (iii) a black card (i.e., a club or, a spade)

**PART-E**

**Answer the following questions :**

51. a) Define Hyperbola as a set of all points in a plane and derive its equation in the form of  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

OR

- b) Prove that geometrically  $\cos(x + y) = \cos x \cdot \cos y - \sin x \cdot \sin y$

52. a) Find the derivative of  $\frac{\cos x}{1 + \sin x}$  w.r.t  $x$

OR

- b) Find the sum of  $n$  terms of series :  $7, 77, 777, 7777, \dots$

**(4M)**

TOP SCORER POCKET MARKS PACKAGE**PRACTICE QUESTION PAPER - 04****AS PER NEW PATTERN 2023-2024****BASED ON FIRST PUC MODEL QUESTION PAPER****SUBJECT : MATHEMATICS (35)****Time: 3 Hrs 15 Min****[ TOTAL QUESTIONS : 52 ]****Max Marks: 80**

- Instructions: (1) The question paper has five Parts namely A, B, C, D and E. Answer all the parts.  
(2) Part-A has 15 multiple choice questions, 5 fill in the blanks questions

**PART-A****I. Answer all the multiple choice questions :****(15 × 1 = 15)**

- The set  $A = \{x : x \in R \text{ and } 0 \leq x < 7\}$  then interval form is  
a)  $(0,7)$  b)  $(0,7]$   
c)  $[0,7]$  d)  $[0,7)$
- If  $f(x) = 2 - 3x, x \in R, x > 0$  then range is  
a)  $[2, \infty)$  b)  $(2, \infty)$   
c)  $[-1, \infty)$  d)  $[-1, \infty)$
- If  $\frac{3\pi}{4}$  it is in radians then degree measure is  
a)  $540^\circ$  b)  $45^\circ$   
c)  $180^\circ$  d)  $135^\circ$
- least positive integral value of m if  $\left(\frac{1+i}{1-i}\right)^m = 1$   
a) 1 b) 2  
c) 3 d) 4
- If  $-\frac{2}{a} > \frac{b}{3}$  then  
a)  $ab < -6$  b)  $ab < 6$   
c)  $ab > -6$  d)  $ab > \frac{a}{b}$
- How many chords can be drawn through 21 points on a circle?  
a) 420 b) 210  
c) 21 d) 840
- $C_0 - C_1 + C_2 - C_3 + C_4 - C_5 + C_6 - C_7 + \dots =$   
a) 0 b)  $2^{n-1}$   
c)  $2^{n-2}$  d)  $2^n$
- For what value of x, the numbers  $-\frac{2}{7}, x, -\frac{7}{2}$  are in G.P  
a)  $\frac{2}{7}$  b)  $\frac{7}{2}$   
c) 1 d) 0

9. If  $m_1$  and  $m_2$  are the slopes of lines then condition for these two lines are parallel is  
 a)  $m_1 \cdot m_2 = -1$   
 b)  $m_1 \cdot m_2 = 1$   
 c)  $m_1 = -m_2$   
 d)  $m_1 = m_2$
10. Equation of circle with centre at origin and radius is  $r$  is  
 a)  $x^2 - y^2 = r^2$   
 b)  $x^2 + (y - r)^2 = r^2$   
 c)  $(x - r)^2 + y^2 = r^2$   
 d)  $x^2 + y^2 = r^2$
11. Eccentricity of hyperbola is always  
 a)  $e > 1$ ,  
 b)  $e < 1$ ,  
 c)  $e = 1$ ,  
 d)  $e = 2$ ,
12. If a point is on  $z$  axis then what are the  $x$  coordinate and  $y$  coordinate, respectively  
 a) 0 and 1,  
 b) 1 and 0,  
 c) 1 and 1,  
 d) 0 and 0,
13. The value of  $\lim_{x \rightarrow \pi} \frac{\sin(\pi-x)}{\pi(\pi-x)}$   
 a)  $\frac{1}{\pi(\pi-x)}$   
 b)  $\pi(\pi-x)$   
 c)  $\frac{1}{\pi}$   
 d)  $\frac{1}{(\pi-x)}$
14. For a discrete frequency distribution consider Variance as  $V$  and Standard deviation as  $S$  then  
 a)  $V = S$   
 b)  $V^2 = S$   
 c)  $S^2 = V$   
 d)  $S = 2V$
15. Let  $S$  is a sample space of a random experiment and  $A$  be the one of the event of  $S$ . If  $A$  is sure event then  
 a)  $A = S$   
 b)  $A \neq S$   
 c)  $A = \emptyset$   
 d) none of these

**II.Fill in the blanks by choosing the appropriate answer from those give in the bracket : (5 × 1 = 5)**

(30,  $-\frac{2}{3}$ , 4,  $\frac{1}{\sqrt{2}}$ , 99)

16. .... elements are there in this relation  $R = \{(x, x^3) : x \text{ is a prime number less than } 10\}$   
 17. The value of  $\sin 765^\circ$  is .....  
 18. If  $n = 6$  and  $r = 2$  then the value of  $\frac{n!}{(n-r)!}$  is .....  
 19. Equation of a line is  $2x + 3y - 4 = 0$ . Then the slope is .....  
 20. The derivative of  $99x$  at  $x = 100$  is .....

**PART-B**

**Answer any six questions :**

**(6 × 2 = 12)**

21. If  $A = \{1,2,3,4,5,6,7,8,9,10\}$ ,  $B = \{2,3,5,7\}$  then find  $A \cup B$  and  $A \cap B$   
 22. If  $A$ =set of letters in “ALLOY” and  $B$ =set of letters in “LOYAL”. Is  $A$  and  $B$  are equal?  
 23. Prove that  $\frac{\cos(\pi+x)\cos(-x)}{\sin(\pi-x)\cos(\frac{\pi}{2}+x)} = \cot^2 x$   
 24. If  $x - iy = \sqrt{\frac{a-ib}{c-id}}$  then prove that  $(x^2 + y^2)^2 = \frac{a^2+b^2}{c^2+d^2}$   
 25. Express  $(-\sqrt{3} + \sqrt{-2})(2\sqrt{3} - i)$  in the form of  $a + ib$   
 26. Solve  $7x + 3 < 5x + 9$ . Show the graph of solution in number line.  
 27. Find  $n$  if  $\frac{{}^n P_4}{{}^{n-1} P_4} = \frac{5}{3}$ ,  $n > 4$   
 28. Which is larger  $(1.01)^{1000000}$  or  $10000$  by using binomial theorem  
 29. Reduce the equation  $3x + 2y - 12 = 0$  into intercept form and find  $x$  and  $y$  intercepts on the axes.

30. Evaluate :  $\lim_{x \rightarrow 2} \left( \frac{3x^2 - x - 10}{x^2 - 4} \right)$

31. An experiment involves rolling a pair of dice and recording the numbers that come up. Describe the following events: A: the sum is greater than 8, B: the sum is at least 7 and a multiple of 3

**PART-C**

Answer any six questions :

(6 × 3 = 18)

32. If  $U = \{1,2,3,4,5,6,7,8,9\}$ ,  $A = \{1,2,3,4\}$  and  $B = \{2,4,6,8\}$  then verify  $(A \cup B)' = A' \cap B'$

33. If  $A = \{2,4,6\}$  and  $B = \{1,3\}$  then prove that  $A \times B \neq B \times A$

34. Prove that  $\cos\left(\frac{3\pi}{2} + x\right) \cos(2\pi + x) \left[ \cot\left(\frac{3\pi}{2} - x\right) + \cot(2\pi + x) \right] = 1$

35. Prove that  $\frac{\sin(x+y)}{\sin(x-y)} = \frac{\tan x + \tan y}{\tan x - \tan y}$

36. If  $z_1 = 2 - i$  and  $z_2 = 1 + i$  then find  $\left| \frac{z_1 + z_2 + 1}{z_1 - z_2 + 1} \right|$

37. Find all pairs of consecutive odd natural numbers, both of which are more than 50, such that their sum is less than 120.

38. Insert 3 numbers between 1 and 256 such that resulting sequence is an G.P

39. Find equation of the line parallel to the line  $4x - 2y + 7 = 0$  and passing through the point  $(2, -4)$

40. Find the equation of parabola with focus  $(0, -3)$  and directrix  $y = 3$

41. Find the set of equation of points which are equidistance from the points  $(3,4, -5)$  and  $(-2,1,4)$ .

42. Find the derivative of  $\frac{1}{x}$  with respect to x from first principle

**PART-D**

Answer any four questions :

(5 × 4 = 20)

43. Define modulus function. Draw the graph of modulus function, also write domain and rang

44. Prove that  $\cos 2x \cos \frac{x}{2} - \cos 3x \cos \frac{9x}{2} = \sin 5x \sin \frac{5x}{2}$

45. Find the number of different 8-letter arrangements that can be made from the letters of the word DAUGHTER so that (i) all vowels occur together (ii) all vowels do not occur together.

46. For all a,b real numbers and n is a positive integer then prove that

$$(a + b)^n = {}^n C_0 a^n + {}^n C_1 a^{n-1} b + {}^n C_2 a^{n-2} b^2 + \dots + {}^n C_n b^n$$

47. Derive the distance between two parallel lines  $y = mx + c_1$  and  $y = mx + c_2$

48. Prove that geometrically  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$  where x being measured in radian (Sandwich theorem)

49. Find the mean deviation about median for the following data

$x_i$	5	7	9	10	12	15
$f_i$	8	6	2	2	2	6

50. A card is selected from a pack of 52 cards.

(a) How many points are there in the sample space?

(b) Calculate the probability that the card is an ace of spades.

(c) Calculate the probability that the card is (i) an ace (ii) black card.

**PART-E**

Answer the following questions :

51. a) Prove that geometrically  $\cos(x + y) = \cos x \cdot \cos y - \sin x \cdot \sin y$

OR

b) Define Ellipse as a set of all points in a plane and derive its equation in the form of  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

52. a) Find the derivative of  $\frac{\sin x + \cos x}{\sin x - \cos x}$  w.r.t x

OR

a) Find the 20th term of the series  $2 \times 4 + 4 \times 6 + 6 \times 8 + \dots + n$  terms

(4M)

TOP SCORER POCKET MARKS PACKAGE**PRACTICE QUESTION PAPER - 05****AS PER NEW PATTERN 2023-2024****BASED ON FIRST PUC MODEL QUESTION PAPER****SUBJECT : MATHEMATICS (35)****Time: 3 Hrs 15 Min****[ TOTAL QUESTIONS : 52 ]****Max Marks: 80**

Instructions: (1) The question paper has five Parts namely A, B, C, D and E. Answer all the parts.

(2) Part-A has 15 multiple choice questions, 5 fill in the blanks questions

(3) Use the graph sheet for the question on linear programming in Part-E.

**PART-A****I. Answer all the multiple choice questions :****(15 × 1 = 15)**

- The number of all subsets of the set  $\emptyset$ 
  - 0
  - 1
  - 2
  - 4
- If  $f(x) = \sqrt{9 - x^2}$  then domain is
  - $(-3, 3)$
  - $[-3, 3]$
  - $(0, 3)$
  - $[0, 3]$
- If  $\frac{7\pi}{6}$  it is in radians then degree measure is
  - $30^\circ$
  - $210^\circ$
  - $180^\circ$
  - $1260^\circ$
- $a + ib$  form of  $(-5i)\left(-\frac{3}{5}i\right)$ 
  - $0 + 0i$
  - $-3 + 0i$
  - $1 + 5i$
  - $0 - 5i$
- If  $-x > 3$  when x is a real number is
  - $x < 3$
  - $-x > -3$
  - $x < -3$
  - None of these
- In how many ways can 5 girls and 3 boys be selected in a row so that no two boys are together.
  - $5! \times 3!$
  - $\frac{5! \times 3!}{8!}$
  - $\frac{5! \times 6!}{3!}$
  - $\frac{5! \times 3!}{(5 \times 3)!}$
- If  $\left(\frac{1}{b} - \frac{1}{a}\right)^5$  then the number of terms in this expansion is
  - 5
  - 4
  - 10
  - 6



24. Find the least positive integral value of  $m$  if  $\left(\frac{1+i}{1-i}\right)^m = 1$
25. Find multiplicative inverse of complex number  $3 - 4i$
26. Solve  $4x + 3 < 6x + 7$ . Show the graph of solution in number line.
27. How many 3-digit numbers can be formed from the digits 1,2,3,4 and 5 assuming that repetition of the digits is allowed?
28. Expand :  $\left(\frac{x}{3} + \frac{1}{x}\right)^5, x \neq 0$
29. Find the equation of line with slope  $\frac{1}{2}$  and y-intercept  $-\frac{3}{2}$
30. Evaluate :  $\lim_{x \rightarrow 0} \left(\frac{(x+1)^5 - 1}{x}\right)$
31. A die is rolled. Let  $E$  : be the event "die shows 4"  $F$  : be the event "die shows even number"  
Are  $E$  and  $F$  mutually exclusive?

**PART-C****Answer any six questions :****(6 × 3 = 18)**

32. If  $U = \{1,2,3,4,5,6,7,8,9\}$ ,  $A = \{1,2,3,4\}$  and  $B = \{3,4,5,6\}$  then verify  $(A \cap B)' = A' \cup B'$
33. Write the relation  $R = \{(x, x + 5) : x \in \{0,1,2,3,4,5\}\}$  in roster form and write domain and range
34. If  $\sec x = \frac{13}{5}$ ,  $x$  lies in fourth quadrant, find other five trigonometric functions
35. Find the radius of the circle in which a central angle of  $60^\circ$  intercepts an arc of length 37.4 cm  
(use  $\pi = \frac{22}{7}$ )
36. Express complex number  $\left(\frac{1}{1-4i} - \frac{2}{1+i}\right)\left(\frac{3-4i}{5+i}\right)$  in the form of  $a + ib$
37. Find all pairs of consecutive odd natural numbers, both of which are larger than 10, such that their sum is less than 40.
38. If A.M and G.M of roots of quadratic equation are 8 and 5, respectively, then obtain the quadratic equation.
39. Find the equation of the line passing through  $(-3,5)$  and perpendicular to the line through the points  $(2,5)$  and  $(-3,6)$ .
40. Find the equation of hyperbola where foci  $(0, \pm 13)$  and length of conjugate axis is 24 units
41. If origin is the Centroid of the triangle PQR with vertices  $P(2a, 2, 6)$ ,  $Q(-4, 3b, -10)$  and  $R(8, 14, 2c)$  then find the values of  $a, b, c$
42. Find the derivative of  $\cos x$  with respect to  $x$  from first principle

**PART-D****Answer any four questions :****(5 × 4 = 20)**

43. Define signum function. Draw the graph of signum function, also write its domain and range
44. Prove that  $\frac{(\sin 7x + \sin 5x) + (\sin 9x + \sin 3x)}{(\cos 7x + \cos 5x) + (\cos 9x + \cos 3x)} = \tan 6x$
45. A committee of 7 has 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) atleast 3 girls?  
(iii) atmost 3 girls?
46. State and prove Binomial Theorem for all natural number
47. Derive the formula for the angle between two lines whose slopes are  $m_1$  and  $m_2$  also write the condition for two lines are parallel and perpendicular
48. Prove that geometrically  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$  where  $x$  being measured in radian (Sandwich theorem)



49. Find the mean deviation about median for the following data

Age	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55
Number	5	6	12	14	26	12	16	9

50. Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify the examination is 0.05 and that Ashima will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that

- Both Anil and Ashima will not qualify the examination.
- Atleast one of them will not qualify the examination and
- Only one of them will qualify the examination.

### PART-E

Answer the following questions :

51. a) Define Parabola as a set of all points in a plane and derive its equation in form of  $y^2 = 4ax$

OR

b) Prove that geometrically  $\cos(x + y) = \cos x \cdot \cos y - \sin x \cdot \sin y$

52. a) Find the sum of n terms of series : 5,55,555,5555, ...

(4M)

OR

b) Find the derivative of  $\frac{x+\cos x}{\tan x}$  w.r.t x

## AS PER NEW PATTERN 2023-2024

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QUESTION PAPERS	NOTATION	TOTAL
MODEL QUESTION PAPERS	MQP-01, MQP-02, MQP-03, MQP-04, MQP-05, MQP-06, MQP-07, MQP-08	<b>8</b>
ANNUAL EXAM QUESTION PAPERS	MARCH-2014, MARCH-2015, MARCH-2016, MARCH-2017, MARCH-2018, MARCH-2019 MARCH-2020, AUGUST-2021, MARCH-2022 MARCH-2023	<b>10</b>
SUPPLEMENTARY QUESTION PAPERS	JUNE-2014, JUNE-2015, JUNE-2016, JUNE-2017, JUNE-2018, JUNE-2019 JUNE-2020, SEPTEMBER-2022, JUNE-2023, AUGUST-2023	<b>10</b>
STATE LEVEL PREPARATORY QUESTION PAPERS	PQP-01, PQP-02, PQP-03, PQP-04, PQP-05, PQP-06, PQP-07, PQP-08, PQP-09, PQP-10,	<b>10</b>
LATEST MODEL QUESTION PAPERS	2019MQP-1, 2019MQP-2, 2019MQP-3 2021MQP-1, 2021MQP-2, 2022MQP-1, 2023MQP-2	<b>7</b>
PRACTICE QUESTION PAPERS PREPARED BY EXPERTS BASED ON NEW PATTERN 2023-2024	EPQP-01, EPQP-02, EPQP-03, EPQP-04, EPQP-05, EPQP-06, EPQP-07, EPQP-08 EPQP-09, EPQP-10	<b>10</b>
SAMPLE QUESTION PAPERS PREPARED BY EXPERTS BASED ON NEW PATTERN 2023-2024	SQP-01, SQP-02, SQP-03, SQP-04, SQP-05, SQP-06, SQP-07, SQP-08, SQP-09, SQP-10,	<b>10</b>
MOST LIKELY EXPECTED QUESTIONS WITH ANSWERS PREPARED BY EXPARTS		<b>25</b>
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# PUC II Year MATHEMATICS

**CHAPTER WISE QUESTIONS  
ANSWERS WITH SOLUTION**

Author :  
**ANAND KABBUR** M.Sc., B.Ed.

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