AS PER NEW PATTERN 2023-2024

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

8 SET OF
NEW PATTERN
QUESTION PAPERS

PUC II YEAR
MATHEMATICS

By,.
NAME: ANAND KABBUR M.Sc., B.Ed.,
MOBILE : 9738237960

KABBUR PUBLICATIONS SAVADATTI 9738237960

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PREPARATORY MODEL QUESTION PAPER - 01

AS PER NEW PATTERN 2023-2024

BASED ON SECOND 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 : $(\mathbf{15 \times 1 = 15})$

1. Let R be the relation in the set $\{1,2,3,4\}$ given by $R = \{(1,2),(1,3)\}$. Then
   a) R is reflexive and symmetric but not transitive. b) R is reflexive and transitive but not symmetric.
   c) R is symmetric and transitive but not reflexive. d) R is transitive but neither reflexive nor symmetric

2. The function $f: N \to N$ is given by $f(x) = 2x + 3, x \in N$ is
   a) surjective b) injective
   c) bijective d) none of these

3. The range or principal value branch of $f(x) = cos^{-1}x$ is
   a) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ b) $(0, \pi)$
   c) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ d) $[0, \pi]$

4. If $A = \begin{bmatrix} 3 & x \\ y & 0 \end{bmatrix}$ and $A = A^T$ then
   a) $x = 0$ and $y = 3$ b) $x + y = 3$
   c) $x = y$ d) $x = -y$

5. The value of determinant $\begin{vmatrix} 1 & -2 & 1 \\ 2 & 4 & 6 \\ 5 & -10 & 5 \end{vmatrix}$ is
   a) 1 b) -1
   c) 2 d) 0

6. If $f(x) = \begin{cases} 1 + x & if\ x \leq 2 \\ 5 - x & if\ x > 2 \end{cases}$ then Right hand derivative of $f(x)$ at $x = 2$
   a) 1 b) 3
   c) -1 d) doea not exists

7. The derivative of e^{-x} with respect to x is
   a) e^{-x} b) e^x
   c) $-e^x$ d) $-e^{-x}$

8. The f is a function defined on the interval I, if f is said to have minimum value in I there exists c such that $f(c) < f(x)$ then
   a) $x = c$ is the point of maximum value
   b) $x = c$ is the point of minimum value
   c) $x = c$ is the extreme point
   d) none of these

9. $\int \frac{x^3-x^2+x-1}{x-1} dx$ is
   a) $x^2 + x + C$
   b) $\frac{x^3}{3} + x + C$
   c) $\frac{x^3}{3} - x + C$
   d) $\frac{x^3}{3} + \frac{x}{2} + C$

10. $\int e^x secx(1 + tanx)\, dx =$
    a) $e^x cosx + C$
    b) $e^x secx + C$
    c) $e^x sinx + C$
    d) $e^x tanx + C$

11. Two vectors $\vec{P} = 2\hat{\imath} + b\hat{\jmath} + 2\hat{k}$ and $\vec{Q} = \hat{\imath} + \hat{\jmath} + \hat{k}$ will be parallel if
    a) $b = 0$,
    b) $b = 1$,
    c) $b = 2$,
    d) $b = -4$,

12. $\overrightarrow{AB} = 4\hat{\imath} + 5\hat{\jmath} + 6\hat{k}$ and $\overrightarrow{OB} = \hat{\imath} + 2\hat{\jmath} + 3\hat{k}$ then $\overrightarrow{AO}$ is
    a) $5\hat{\imath} + 7\hat{\jmath} + 9\hat{k}$,
    b) $3\hat{\imath} + 3\hat{\jmath} + 3\hat{k}$,
    c) $5\hat{\imath} - 7\hat{\jmath} - 9\hat{k}$,
    d) $-3\hat{\imath} - 3\hat{\jmath} - 3\hat{k}$,

13. If the direction cosines l, m, n of a line are $0, -\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$ then the angle made y the line with the positive direction of y-axis is
    a) 45^0
    b) -45^0
    c) 135^0
    d) 225^0

14. The corner points of the feasible region determined by the system of linear constraints are $(0,20)$, $(0,10)$, $(5,5)$ and $(15,15)$ The maximum value of the objective function $Z = 3x + 9y$ is occur at
    a) Only one point
    b) Two points
    c) Infinite number of points
    d) Three points

15. Let F is event of a sample space S of an experiment, then $P(S/F)$ is
    a) -1
    b) 0.25
    c) 0.5
    d) 1

II.Fill in the blanks by choosing the appropriate answer from those give in the bracket : $(\mathbf{5 \times 1 = 5})$

$$\left(\mathbf{5},\ \mathbf{\frac{20}{81}}, -\frac{\pi}{3}, \mathbf{\frac{70}{11}}, \frac{2\pi}{3}, \mathbf{2}\right)$$

16. The principal value of $cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$ is ………………
17. If A is a square matrix and $A(adjA) = \begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix}$ then the value of $|A|$ is ………………
18. The degree of the differential equation $\left(\frac{dy}{dx}\right)^2 + \frac{dy}{dx} - sin^2y = 0$ is ………………
19. The lines $\frac{1-x}{3} = \frac{7y-14}{2p} = \frac{z-3}{2}$ and $\frac{7-7x}{3p} = \frac{y-5}{1} = \frac{6-z}{5}$ are perpendicular, then p is ………………
20. Two balls are drawn at random with replacement from a box containing 10 black and 8 red balls. The probability that first ball is black and second is red is ………………

PART-B

Answer any six questions : $(\mathbf{6 \times 2 = 12})$

21. Evaluate $tan^{-1}\left[2cos\left(2sin^{-1}\frac{1}{2}\right)\right]$
22. Find the area of Triangle whose vertices are $(3,8), (-4,2)$ and $(5,1)$ using determinants
23. If $y = sin^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, $-1 < x < 1$ then find $\frac{dy}{dx}$
24. The radius of an air bubble is increasing at the rate of 1/2 cm/s. At what rate is the volume of the bubble increasing when the radius is 1 cm?
25. Find the maximum and the minimum values, if any, of the function f given by $f(x) = -(x-1)^2 + 10, x \in R$
26. Evaluate $\int \frac{tan^{-1}x}{1+x^2}dx$
27. Evaluate $\int xcosx\, dx$
28. If $\vec{a}$ is unit vector and $(\vec{x} - \vec{a}) \cdot (\vec{x} + \vec{a}) = 15$ then find $|\vec{x}|$
29. Find the angle between two pair of lines
 $\vec{r} = 2\hat{\imath} - 5\hat{\jmath} + \hat{k} + \lambda\left(3\hat{\imath} + 2\hat{\jmath} + 6\hat{k}\right)$ and $\vec{r} = 7\hat{\imath} - 6\hat{\jmath} + \mu\left(\hat{\imath} + 2\hat{\jmath} + 2\hat{k}\right)$
30. Given that two numbers appearing on throwing two die are different. Find the probability of the event the sum of the numbers on the dice is 4.
31. If A and B are independent events with $P(A) = 0.3$ and $P(B) = 0.4$ find (i) $P(A/B)$ (ii) $P(B/A)$

PART-C

Answer any six questions : $(\mathbf{6 \times 3 = 18})$

32. Check whether the relation R in the set N of natural numbers defined by
 $R = \{(x, y): y = x + 5 \;\; and \;\; x < 4\}$ is reflexive, symmetric and transitive?
33. Write $tan^{-1}\left(\frac{cosx}{1-sinx}\right), \frac{-3\pi}{2} < x < \frac{\pi}{2}$ in simplest form
34. Express the matrix $A = \begin{bmatrix} 1 & 5 \\ -1 & 2 \end{bmatrix}$ as sum of Symmetric and Skew-symmetric matrices
35. Differentiate $(sinx)^{sinx}$, $0 < x < \pi$ with respect to x
36. If $x = a(\theta + sin\theta)$ and $y = a(1 - cos\theta)$ Prove that $\frac{dy}{dx} = tan\left(\frac{\theta}{2}\right)$
37. Find the intervals in which the function f given by $f(x) = 10 - 6x - 2x^2$ is
 (a) decreasing (b) increasing
38. Evaluate $\int \frac{x}{(x-1)(x-2)}dx$
39. Find the general solution of differential equation $ylog_e y dx - xdy = 0$
40. Find the area of parallelogram whose adjacent sides are given by the vectors
 $\vec{a} = \hat{\imath} + \hat{\jmath} - \hat{k}$ and $\vec{b} = \hat{\imath} - \hat{\jmath} + \hat{k}$
41. Find unit vector perpendicular to each of the vectors $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$
 where $\vec{a} = \hat{\imath} + \hat{\jmath} + \hat{k}$ and $\vec{b} = \hat{\imath} + 2\hat{\jmath} + 3\hat{k}$
42. Bag I contains 3 red and 4 black balls and Bag II contains 4 red and 5 black balls. One ball is transferred from Bag I to Bag II and then a ball is drawn from Bag II. The ball so drawn is found to be red in colour. Find the probability that the transferred ball is black.

PART-D

Answer any four questions : $(\mathbf{5 \times 4 = 20})$

43. Prove that the function $f: N \to Y$ is defined as $f(x) = 4x + 3$, where, $Y = \{y \in N : y = 4x + 3 \text{ for some } x \in N\}$ is invertible. write the inverse of $f(x)$
44. If $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ -1 & 4 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & -2 \\ 3 & 0 \end{bmatrix}$
    Calculate $A(BC)$and $(AB)C$, show that $A(BC) = (AB)C$
45. Solve the following system of linear equation by matrix method
    $x - y + 3z = 10$
    $x - y - z = -2$
    $2x + 3y + 4z = 4$
46. If $y = 5\cos(\log x) + 7\sin(\log x)$ show that $x^2y_2 + xy_1 + y = 0$
47. Find the integral of $\sqrt{a^2 - x^2}$ w.r.t x and hence evaluate, $\int \sqrt{5 - x^2 + 2x}\, dx$
48. Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ by the method of integration
49. Solve $x\log x \frac{dy}{dx} + y = \frac{2}{x}\log x$
50. Derive the vector equation for Shortest distance between two skew lines

PART-E

Answer the following questions :

51. a) Prove that $\int_{-a}^{a} f(x)dx = \begin{cases} 2\int_0^a f(x)dx & if\ f\ is\ even\ function \\ 0 & if\ f\ is\ odd\ function \end{cases}$ (6M)

    and hence find the value of $\int_{-\pi/2}^{\pi/2} (x^3 + x\cos x)\, dx$

    OR

    b) Solve the following linear programming problem graphically: (6M)
    Minimise and Maximise $Z = 5x + 10y$
    Subject to $x + 2y \le 120$
    $x + y \ge 60$
    $x - 2y \ge 0$
    $x, y \ge 0$
52. a) If $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$, prove that the equation $A^2 - 4A + I = O$,
    where $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $O = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$. Using this equation find A^{-1} (4M)

    OR

    b) Find the value of k if $f(x) = \begin{cases} kx + 1 & if\ x \le \pi \\ \cos x & if\ x > \pi \end{cases}$ is continuous at $x = \pi$ (4M)

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PREPARATORY MODEL QUESTION PAPER - 02

AS PER NEW PATTERN 2023-2024

BASED ON SECOND 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 : $(\mathbf{15 \times 1 = 15})$

1. The relation R in the set {1,2,3} given by $R = \{(1,1),(2,3),(3,2),(3,3)\}$ is
   a) Symmetric only b) Symmetric and transitive
   c) Transitive only d) Transitive but not symmetric

2. The function $f: R \to R$ is given by $f(x) = 4x + 7, x \in R$ is
   a) one-one b) many-one
   c) odd d) even

3. The value of $sin(tan^{-1}x)$, $|x| < 1$ is equal to
   a) $\frac{x}{\sqrt{1-x^2}}$ b) $\frac{1}{\sqrt{1-x^2}}$
   c) $\frac{1}{\sqrt{1+x^2}}$ d) $\frac{x}{\sqrt{1+x^2}}$

4. A square matrix $A = [a_{ij}]$ such that $a_{ij} = 0$ for $i \neq j$ and $a_{ij} = k$ for $i = j$ where k is constant, then A called (MQP3)
   a) Unit matrix b) Scalar matrix
   c) Diagonal matrix d) Row matrix

5. If $\begin{vmatrix} 2 & 4 \\ 5 & 1 \end{vmatrix} = \begin{vmatrix} 2x & 4 \\ 6 & x \end{vmatrix}$, then what is the value of x.
   a) $\sqrt{3}$ b) $\pm\sqrt{3}$
   c) $\pm\sqrt{6}$ d) $\sqrt{6}$

6. The number of points in which the function $f(x) = [x], -3 < x < 3$ is discontinuous
   a) 3 b) 5
   c) 4 d) infinite

7. if $y = log\left(\frac{1-x^2}{1+x^2}\right)$ then $\frac{dy}{dx}$ is
   a) $\frac{4x^3}{1-x^4}$ b) $\frac{-4x}{1-x^4}$
   c) $\frac{1}{4-x^4}$ d) $\frac{-4x^3}{1-x^4}$

8. If $f(x) = 2x$ has both value maximum and minimum value, then which one is correct

   a) $x \in (-14)$ b) $x \in (-1,4]$
   c) $x \in [-1,4)$ d) $x \in [-1,4]$

9. The value of $\int \frac{sec^2x}{cosec^2x}dx$ is

   a) $secx - x + C$ b) $tanx + x + C$
   c) $secx + x + C$ d) $tanx - x + C$

10. The value of $\int e^x(sinx + cosx)\,dx =$

    a) $e^x cosx + C$ b) $e^x sinx + C$ c) $-e^x cosx + C$ d) $-e^x sinx + C$

11. If $\vec{a} \cdot \vec{b} = 0$ then (MQP6)

    a) $\vec{a}$ is perpendicular to $\vec{b}$, b) $\vec{a}$ is parallel to $\vec{b}$,
    c) $\vec{a} + \vec{b} = \vec{0}$, d) $\vec{a} - \vec{b} = \vec{0}$,

12. θ is the angle between $\vec{a}$ and $\vec{b}$. If $\vec{a} \cdot \vec{b} \geq 0$ onlly when

    a) $0 < \theta < \frac{\pi}{2}$, b) $0 \leq \theta \leq \frac{\pi}{2}$,
    c) $0 < \theta < \pi$, d) $0 \leq \theta \leq \pi$,

13. The angle between the lines whose direction ratios are a, b, c and $b - c, c - a, a - b$ is

    a) 0^0 b) 30^0
    c) 60^0 d) 90^0

14. In a L.P.P, if the objective function $Z = ax + by$ has the minimum value is 100 on two corner points of the feasible region determined by the system of linear constraints. The value of objective function on the mid point of those two corner point is

    a) 50 b) 100
    c) 150 d) 200

15. If A and B are two events such that $P(A) \neq 0$ and $P(B/A) = 1$, then

    a) $A \subset B$ b) $B \subset A$
    c) $B = \emptyset$ d) $A = \emptyset$

II.Fill in the blanks by choosing the appropriate answer from those give in the bracket : $(\mathbf{5 \times 1 = 5})$

$$\left(\frac{2\pi}{3},\ \textit{not defined},\ 3,\ 7,\ \frac{2}{5525},\frac{\pi}{3}\right)$$

16. The value of $sin^{-1}\left(sin\frac{2\pi}{3}\right)$ is ………………
17. If the matrix $\begin{bmatrix} 5-x & x+1 \\ 2 & 4 \end{bmatrix}$ is singular, then the value of x is ………………
18. The degree of differential equation $\frac{d^3y}{dx^3} + y^2 + e^{\frac{dy}{dx}} = 0$ is ………………
19. The lines $\frac{x-5}{k} = \frac{y+2}{-5} = \frac{z}{1}$ and $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ are perpendicular, then k is ………………
20. Three cards are drawn successively, without replacement from a pack of 52 well shuffled cards. the probability that first two cards are kings and the third card drawn is an ace is ………………

PART-B

Answer any six questions : $(\mathbf{6 \times 2 = 12})$

21. Evaluate: $tan^{-1}(1) + cos^{-1}\left(-\frac{1}{2}\right) + sin^{-1}\left(-\frac{1}{2}\right)$.
22. Find the equation of line joining $(1,3)$ and origin using determinants
23. Find $\frac{dy}{dx}$ if $sin^2x + \cos^2y = k$, where k is constant
24. A balloon, which always remains spherical has a variable radius. Find the rate at which its volume is increasing with the radius when the later is 10 cm.
25. Find the maximum and the minimum values, if any, of the function f given by $f(x) = (2x - 1)^2 + 3$, $x \in R$
26. Evaluate $\int x sec^2 x\, dx$
27. Evaluate $\int_1^2 e^x \left(\frac{1}{x} - \frac{1}{x^2}\right) dx$
28. Find the vector in the direction of the vector $\vec{a} = 2\hat{i} + 3\hat{j} + \hat{k}$ that has magnitude 7 units
29. Find the angle between two pair of lines
    $\vec{r} = 3\hat{i} + 2\hat{j} - 4\hat{k} + \lambda\left(\hat{i} + 2\hat{j} + 2\hat{k}\right)$ and $\vec{r} = 5\hat{i} - 2\hat{j} + \mu\left(3\hat{i} + 2\hat{j} + 6\hat{k}\right)$
30. A die is thrown three times. Events A and B are defined as below: A : 4 on the third throw, B : 6 on the first and 5 on the second throw. Find the probability of A given that B has already occurred.
31. If A and B are two events such that $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{8}$ find $P(not\ A\ and\ not\ B)$

PART-C

Answer any six questions : $(\mathbf{6 \times 3 = 18})$

32. Check whether the relation R in the set $A = \{1,2,3,4,5,6\}$ defined by
    $R = \{(a, b): b = a + 1\}$ is reflexive, symmetric or transitive?
33. Find the value of $tan\left[sin^{-1}\frac{3}{5} + cot^{-1}\frac{3}{2}\right]$
34. If A and B are the symmetric matrices of same order then show that AB is symmetric if and only if A and B are commute. that is $AB = BA$
35. Find $\frac{dy}{dx}$ if $y = (sin^{-1}x)^x$
36. Find $\frac{dy}{dx}$ If $x = 10(t - sint)\ and\ y = 12(1 - cost)$
37. Find the intervals in which the function f given by $f(x) = 2x^2 - 3x$ is
    (a) decreasing (b) increasing
38. Evaluate $\int \frac{2x}{(x+2)(x+1)} dx$
39. Find the general solution of differential equation $\frac{dy}{dx} = (1 + x^2)(1 + y^2)$
40. Find the area of parallelogram whose adjacent sides are given by the vectors
    $\vec{a} = \hat{i} - \hat{j} + 3\hat{k}$ and $\vec{b} = 2\hat{i} - 7\hat{j} + \hat{k}$
41. Find the vector perpendicular to each of the vectors $\vec{a} = 2\hat{i} + \hat{j} + 3\hat{k}, \vec{b} = 3\hat{i} + 5\hat{j} - 2\hat{k}$ which has magnitude 10 units
42. Assume that the chances of a patient having a heart attack is 40%. It is also assumed that a meditation and yoga course reduce the risk of heart attack by 30% and prescription of certain drug reduces its chances by 25%. At a time a patient can choose any one of the two options with equal probabilities. It is given that after going through one of the two options the patient selected at random suffers a heart attack. Find the probability that the patient followed a course of meditation and yoga?

PART-D

Answer any four questions : $(\mathbf{5 \times 4 = 20})$

43. Define Bijective function. Check the injectivity and surjectivity of the function $f: R \to R$ defined by $f(x) = 3 - 4x$.
44. If $A = \begin{bmatrix} 2 & 3 \\ 4 & -5 \end{bmatrix}, B = \begin{bmatrix} 3 & 8 \\ 11 & 21 \end{bmatrix}$ $and\ C = \begin{bmatrix} 7 & 13 \\ 5 & 19 \end{bmatrix}$
calculate $BA,\ CA$ and $(B + C)A$ and verify $(B + C)A = BA + CA$
45. Solve the following system of linear equation by matrix method
$x + 2y + 3z = 2$
$2x + 3y + z = -1$
$x - y - z = -2$
46. If $y = e^{a\cos^{-1}x}$, $-1 \le x \le 1$ then prove that $(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - a^2y = 0$
47. Find the integral of $\frac{1}{\sqrt{x^2+a^2}}$ w.r.t x and hence evaluate $\int \frac{1}{\sqrt{x^2+2x+4}}dx$
48. Find the area of region bounded by ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$ by the method of integration
49. Find the general solution of differential equation $x\frac{dy}{dx} + 2y = x^2 logx$
50. Derive the Equation of the line in space through a point and parallel to the vector both in vector form and Cartesian form

PART-E

Answer the following questions :

51. a) Prove that $\int_0^{2a} f(x)dx = \begin{cases} 2\int_0^a f(x)dx & \text{if } f(2a - x) = f(x) \\ 0 & \text{if } f(2a - x) = -f(x) \end{cases}$ (6M)

and hence find the value of $\int_0^{2\pi} cos^5 x\, dx$,

OR

b) Solve the following linear programming problem graphically: (6M)

Minimise and Maximise $Z = 3x + 9y$

Subjected to $x + 3y \le 60$

$x + y \ge 10$

$x \le y$

$x \ge 0, y \ge 0$

52. b) Show that the matrix $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ satisfies the equation $A^2 - 5A + 7I = O$, where I is 2×2 identity matrix and O is 2×2 zero matrix. Using this equation, find A^{-1} (4M)

OR

b) Find the value of k if $f(x) = \begin{cases} kx + 1 & if\ x \le 5 \\ 3x - 5 & if\ x > 5 \end{cases}$ is continuous at $x = 5$ (4M)

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PREPARATORY MODEL QUESTION PAPER - 03

AS PER NEW PATTERN 2023-2024

BASED ON SECOND 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 : $(\mathbf{15 \times 1 = 15})$

1. The relation R in the set {1,2,3} given by $R = \{(1,1), (2,2), (3,3), (1,2), (2,3), (1,3)\}$ is
   a) Reflexive but not symmetric
   b) Reflexive but not transitive
   c) Symmetric and transitive
   d) Neither symmetric nor transitive

2. The function $f: R \to R$ is given by $f(x) = \frac{1}{x}, x \in R - \{0\}$ is
   a) one-one
   b) onto
   c) bijective
   d) f is nod defined

3. Domain of the function $f(x) = sin^{-1}x$ is
   a) $(-1,1)$
   b) $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$
   c) $(-\infty, \infty)$
   d) $[-1,1]$

4. If $A = \begin{bmatrix} 1 & -2 & 1 \\ 2 & 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ 3 & 2 \\ 1 & 1 \end{bmatrix}$ then $(AB)'$ is
   a) $\begin{bmatrix} -3 & -2 \\ 10 & 7 \end{bmatrix}$
   b) $\begin{bmatrix} -3 & 10 \\ -2 & 7 \end{bmatrix}$
   c) $\begin{bmatrix} -3 & 7 \\ 10 & 2 \end{bmatrix}$
   d) $\begin{bmatrix} -3 & 7 \\ 10 & -2 \end{bmatrix}$

5. if $|AB| = 16$, $|A| = 8$ where A and B are square matrices of same order then $|B|$ is
   a) 8
   b) 4
   c) 2
   d) 1

6. If $f(x) = cos(sinx)$ then the derivative of $f(x)$ is equal to
   a) $-sin(sinx)cosx$
   b) $-sin(sinx)sinx$
   c) $-sin(sinx)$
   d) $cos(sinx)cosx$

7. The derivative $log_{10}x$ w.r.t x is
   a) $\frac{log_{10}e}{x}$
   b) $\frac{log_{10}x}{x}$
   c) $\frac{log_{10}10}{x}$
   d) $\frac{log_e 10}{x}$

8. The function $f(x) = sin2x + 5$ is
   a) Does not attain maximum and minimum b) has maximum value is 5
   c) has minimum value is 5 d) has minimum value is 4

9. The value of $\int \frac{10x^9+10^x log_e 10}{x^{10}+10^x} dx$ is
   a) $10^x - x^{10} + C$ b) $10^x + x^{10} + C$
   c) $log(10^x - x^{10}) + C$ d) $log(10^x + x^{10}) + C$

10. The value of $\int \left(\frac{d}{dx} e^{5x}\right) dx =$
    a) $e^{5x} + C$ b) $5e^{5x} + C$
    c) $\frac{e^{5x}}{5} + C$ d) $5x + C$

11. The values of x and y respectively if $2\hat{\imath} + 3\hat{\jmath}$ and $x\hat{\imath} + y\hat{\jmath}$ are equal
    a) 4,9 , b) 3,2 ,
    c) 2,3 , d) 0,0 ,

12. If $\vec{a} = 2\hat{\imath} - 3\hat{\jmath} + 4\hat{k}$ and $\vec{b} = \hat{\imath} + 2\hat{\jmath} + \hat{k}$ then $\vec{a} + \vec{b}$ is
    a) $\hat{\imath} + \hat{\jmath} + 3\hat{k}$, b) $3\hat{\imath} - \hat{\jmath} + 5\hat{k}$,
    c) $\hat{\imath} - \hat{\jmath} - 3\hat{k}$, d) $2\hat{\imath} + \hat{\jmath} + \hat{k}$,

13. The equation of line $\frac{x-2}{1} = \frac{y+1}{2} = \frac{z-4}{-1}$ passing through the point is
    a) $(-2,1,-4)$ b) $(2,-1,4)$
    c) $(1,2,-1)$ d) $(-1,-2,1)$

14. The optimal value of the objective function ia attained at the
    a) points on x-axis b) points on y-axis
    c) corner points of the feasible region d) non corner points

15. Two events A and B will be independent, if
    a) A and B are mutually exclusive b) $P(A'B') = [1 - P(A)][1 - P(B)]$
    c) $P(A) = P(B)$ d) $P(A) + P(B) = 1$

II.Fill in the blanks by choosing the appropriate answer from those give in the bracket : $(\mathbf{5 \times 1 = 5})$

$$\left(\mathbf{110},\ -\frac{\mathbf{10}}{\mathbf{7}},\ \mathbf{2},\ \frac{\mathbf{3}}{\mathbf{7}},\ \frac{2\pi}{3}, -\frac{\pi}{3}\right)$$

16. The principal value of $cos^{-1}\left(-\frac{1}{2}\right)$ is ………………
17. If A_{ij} is the cofactor of the element a_{ij} of $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$ then $a_{32}A_{32}$ is ………………
18. The Order of differential equation $\left(\frac{ds}{dt}\right)^4 + 3s\frac{d^2s}{dt^2} = 0$ is ………………
19. The lines $\frac{x-1}{-3} = \frac{y-2}{2k} = \frac{z-3}{2}$ and $\frac{x-1}{3k} = \frac{y-1}{1} = \frac{z-6}{-5}$ are perpendicular, then k is ………………
20. An urn contains 10 black and 5 white balls. Two balls are drawn from the urn one after the other without replacement. the probability that both drawn balls are black is ………………

PART-B

Answer any six questions : $(\mathbf{6 \times 2 = 12})$

21. Evaluate: $cos^{-1}\left(\frac{1}{2}\right) + 2sin^{-1}\left(\frac{1}{2}\right)$.
22. Let $A(1,3), B\ (0,0)\ and\ C(k,0)$ are the vertices of triangle ABC of area 3 sq units. Find k using determinant method.
23. Find $\frac{dy}{dx}$ if $sin^2x + \cos(xy) = k$, where k is constant.
24. A balloon, which always remains spherical on inflation, is being inflated by pumping in 900 cubic centimetres of gas per second. Find the rate at which the radius of the balloon increases when the radius is 15 cm.
25. Find the maximum and the minimum values, if any, of the function f given by $g(x) = -|x + 1| + 3, x \in R$
26. Evaluate $\int \frac{(1+logx)^2}{x} dx$
27. Evaluate $\int xsinx\, dx$
28. Find Projection of vector $\hat{\imath} + 3\hat{\jmath} + 7\hat{k}$ on vector $7\hat{\imath} - \hat{\jmath} + 8\hat{k}$
29. Find the angle between two pair of lines
    $\vec{r} = 3\hat{\imath} + 5\hat{\jmath} - \hat{k} + \lambda\left(\hat{\imath} + \hat{\jmath} + \hat{k}\right)$ and $\vec{r} = 7\hat{\imath} + 4\hat{\jmath} + \mu\left(2\hat{\imath} + 2\hat{\jmath} + 2\hat{k}\right)$
30. Ten cards numbered 1 to 10 are placed in a box, mixed up thoroughly and then one card is drawn randomly. If it is known that the number on the drawn card is more than 3, what is the probability that it is an even number?
31. Given that the events A and B such that $P(A) = 1/2, P(A \cup B) = 3/5$ and $P(B) = k$ Find k if A and B are independent events

PART-C

Answer any six questions : $(\mathbf{6 \times 3 = 18})$

32. Determine whether the relation R in the set $A = \{1,2,3, \dots \dots .13,14\}$ defined by
    $R = \{(x, y): 3x - y = 0\}$ is reflexive, symmetric and transitive?
33. Find the value of $tan\frac{1}{2}\left[sin^{-1}\left(\frac{2x}{1+x^2}\right) + cos^{-1}\left(\frac{1-y^2}{1+y^2}\right)\right], |x| < 1, y > 0\ and\ xy < 1$
34. If A and B are invertible matrices of same order then show that $(AB)^{-1} = B^{-1}A^{-1}$
35. If $x = a(\theta - sin\theta)\ and\ y = a(1 + cos\theta)$ Prove that $\frac{dy}{dx} = -cot\left(\frac{\theta}{2}\right)$
36. If $y = x \cdot cosx$, find $\frac{d^2y}{dx^2}$
37. Find the intervals in which the function f given by $f(x) = x^2 - 4x + 6$ is
    (a) decreasing (b) increasing
38. Evaluate $\int \frac{x}{(x+1)(x+2)} dx$
39. Solve $sec^2x\, tanydx + sec^2y\, tanxdy = 0$
40. Find the area of parallelogram whose adjacent sides are given by the vectors
    $\vec{a} = 3\hat{\imath} + \hat{\jmath} + 4\hat{k}$ and $\vec{b} = \hat{\imath} - \hat{\jmath} + \hat{k}$
41. Find unit vector perpendicular to each of the vectors $\vec{a} + \vec{b}\ and\ \vec{a} - \vec{b}$
    where $\vec{a} = 3\hat{\imath} + 2\hat{\jmath} + 2\hat{k}$ and $\vec{b} = \hat{\imath} + 2\hat{\jmath} - 2\hat{k}$
42. A factory has two machines A and B. Past record shows that machine A produced 60% of the items of output and machine B produced 40% of the items. Further, 2% of the items produced by machine A and 1% produced by machine B were defective. All the items are put into one stockpile and then one item is chosen at random from this and is found to be defective. What is the probability that it was produced by machine B?

PART-D

Answer any four questions : $(\mathbf{5 \times 4 = 20})$

43. Verify whether the function $f: R - \{3\} \to R - \{1\}$ defined by $f(x) = \frac{x-2}{x-3}$ is one-one and onto or not. Give reason.
44. If $A = \begin{bmatrix} 2 & 0 & 1 \\ 0 & -3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$ $verfy\ A^3 - 3A^2 - 10A + 24I = O$
45. Solve the following system of linear equation by matrix method
$x + y + z = 6$
$y + 3z = 11$
$x + z = 2y$
46. If $y = sin^{-1}x$ then show that $(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 0$
47. Find the integral of $\frac{1}{x^2+a^2}$ w.r.t x and hence evaluate $\int \frac{1}{x^2-6x+13}dx$
48. Find the area of region of circle $x^2 + y^2 = a^2$ by the method of integration
49. Find the general solution of differential equation $cos^2x\frac{dy}{dx} + y = tanx$, where $0 \le x \le \frac{\pi}{2}$
50. Derive the Equation of the line in space through a point and parallel to the vector both in vector form and Cartesian form

PART-E

Answer the following questions :

51. a) Prove that $\int_a^b f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx$ and hence find the value of $\int_{-5}^{5}|x + 2|\, dx$ (6M)

OR

b) Solve the following linear programming problem graphically: (6M)
Minimise and Maximise $Z = x + 2y$
subject to $x + 2y \ge 100$
$2x - y \le 0$
$2x + y \le 200$
$x, y \ge 0$

52. a) Find the value of k if $f(x) = \begin{cases} kx^2 & if\ x \le 2 \\ 3 & if\ x > 2 \end{cases}$ is continuous at $x = 2$ (4M)

OR

b) Prove that the matrix $A = \begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix}$ satisfies the equation $A^2 - 3A - 7I = O$,
where $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $O = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$. Find A^{-1} (4M)

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PREPARATORY MODEL QUESTION PAPER - 04

AS PER NEW PATTERN 2023-2024

BASED ON SECOND 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 : $(\mathbf{15 \times 1 = 15})$

1. The relation R in the set {1,2,3} given by $R = \{(1,1),(2,3),(3,2),(3,3)\}$ is
a) Symmetric only
b) Symmetric and transitive
c) Transitive only
d) Transitive but not symmetric

2. The function $f: R \to R$ is given by $f(x) = 3x, x \in R$ then f is
a) one-one and onto
b) many-one and onto
c) one-one but not onto
d) neither one-one nor onto

3. The value of $cos^{-1}\left(cos\frac{7\pi}{6}\right)$ is equal to
a) $\frac{7\pi}{6}$
b) $\frac{5\pi}{6}$
c) $\frac{\pi}{3}$
d) $\frac{\pi}{6}$

4. If $A = \begin{bmatrix} cos\alpha & -sin\alpha \\ sin\alpha & cos\alpha \end{bmatrix}$ and $A + A' = I$ then the value of α is
a) $\frac{\pi}{6}$
b) $\frac{\pi}{3}$
c) π
d) $\frac{3\pi}{2}$

5. If A is an invertible matrix of order three with $|5 \cdot adjA| = 5$ then $|A|$ is equal to.
a) ± 1
b) $\pm\frac{1}{25}$
c) $\pm\frac{1}{5}$
d) ± 5

6. If $f(x) = cos^{-1}x$ then the domain of $f'(x)$ is
a) $[-1,1]$
b) $(-1,1)$
c) R
d) $\left(\frac{-\pi}{2},\frac{\pi}{2}\right)$

7. If $y = 2^{sinx}$ then $\frac{dy}{dx}$ is
a) $sinx \cdot 2^{sinx-1}(cosx)$
b) $sinx \cdot log2 \cdot (cosx)$
c) $-2^{sinx} \cdot log2 \cdot (cosx)$
d) $2^{sinx} \cdot log2 \cdot (cosx)$

8. Let $f(x)$ be a continuous function at a critical point c, if $f'(x)$ does not change sign as x increases through c, then
   a) c is the point of local maxima
   b) c is the point of local minima
   c) c is the point of inflection
   d) none of these

9. $\int cos2x\, dx$ is
   a) $-\frac{sin2x}{2}+c$
   b) $-\frac{cos2x}{2}+c$
   c) $\frac{cos2x}{2}+c$
   d) $\frac{sin2x}{2}+c$

10. $\int e^x\left(cos^{-1}x-\frac{1}{\sqrt{1-x^2}}\right)dx$ is
   a) $e^x\left(\frac{1}{\sqrt{1-x^2}}\right)+C$
   b) $e^x(cos^{-1}x)+C$
   c) $e^x\left(\frac{-1}{\sqrt{1-x^2}}\right)+C$
   d) $-e^x(cos^{-1}x)+C$

11. The vector parallel to the vector $3\hat{\imath}+\hat{\jmath}-2\hat{k}$ is
   a) $3\hat{\imath}+\hat{\jmath}+2\hat{k}$
   b) $\hat{\imath}+3\hat{\jmath}-2\hat{k}$
   c) $-6\hat{\imath}-2\hat{\jmath}+4\hat{k}$
   d) $6\hat{\imath}-2\hat{\jmath}+4\hat{k}$

12. The set of unit vectors in XY-plane, as θ varies from 0 to 2π
   a) $sin\theta\hat{\imath}+cosec\theta\hat{\jmath}$
   b) $sec\theta\hat{\imath}+cos\theta\hat{\jmath}$
   c) $cos\theta\hat{\imath}+sin\theta\hat{\jmath}$
   d) $tan\theta\hat{\imath}+cot\theta\hat{\jmath}$

13. If α,β and γ are direction angles of a directed line $\overrightarrow{OP}$ then direction angles of a directed line $\overrightarrow{PO}$ are
   a) $\pi-\alpha, \pi-\beta, \pi-\gamma$
   b) $-\alpha, -\beta, -\gamma$
   c) α, β, γ
   d) $\frac{\pi}{2}-\alpha, \frac{\pi}{2}-\beta, \frac{\pi}{2}-\gamma$

14. The corner points of the feasible region determined by the system of linear constraints are (0,0), (5,0), (3,4) and (0,5) The maximum value of the objective function $Z=ax+by$ is occur at both (3,4) and (0,5) then the condition for a and b is
   a) $a=b$
   b) $a=2b$
   c) $a=3b$
   d) $b=3a$

15. A and B are two events of a sample space S, if $P(A)\neq 0$ and A is a subset of B then $P(B/A)$ is
   a) $P(B)$
   b) $P(S)$
   c) $P(A)$
   d) $P(A/B)$

II.Fill in the blanks by choosing the appropriate answer from those give in the bracket : $(\mathbf{5\times 1=5})$

$$\left(-\frac{\sqrt{3}}{2},\ -\frac{10}{7},\ 2,\ \frac{2}{7},\ -\frac{1}{6},\ \frac{\sqrt{3}}{2}\right)$$

16. The value of $sin\left[\frac{\pi}{3}-sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right]$ is ………………
17. If $A=\begin{bmatrix}1 & 2\\ 4 & 2\end{bmatrix}$, then $|A^{-1}|$ is ………………
18. Order of differential equation $y''+e^{y'}=0$ is ………………
19. The lines $\frac{x-1}{-3}=\frac{y-2}{2k}=\frac{z-3}{2}$ and $\frac{x-1}{3k}=\frac{y-1}{1}=\frac{z-6}{-5}$ are perpendicular, then k is ………………
20. If a leap year is selected at random, the chance that it will contain 53 Tuesday is ………………

PART-B

Answer any six questions : $(\mathbf{6 \times 2 = 12})$

21. Write simplest form of $tan^{-1}\left(\sqrt{\frac{1-cosx}{1+cosx}}\right)$, $0 < x < \pi$
22. Find area of Triangle whose vertices are $(-2,-3),(3,2)\ and\ (-1,-8)$ using determinants.
23. Find $\frac{dy}{dx}$ if $ax + by^2 = cosy$.
24. Find the rate of change of the area of a circle with respect to its radius *r* when *r* = 4 cm.
25. Find the minimum value of the function *f* given by $f(x) = |x + 2| - 1,\ x \in R$
26. Evaluate $\int \frac{x}{(x-1)(x-2)} dx$
27. Evaluate $\int_{-1}^{1} 5x^4\sqrt{x^5 + 1}\, dx$
28. Find the projection of vector $\vec{a} = \hat{\imath} + 2\hat{\jmath} + \hat{k}$ on vector $\vec{b} = 2\hat{\imath} + 3\hat{\jmath} + 2\hat{k}$.
29. Find the angle between two pair of lines $\frac{x+3}{3} = \frac{y-1}{5} = \frac{z+3}{4}$ and $\frac{x+1}{1} = \frac{y-4}{1} = \frac{z-5}{2}$
30. A fair of die is rolled. Consider the events $E = \{2,4,6\}$ and $F = \{1,2\}$ find $P(E/F)$
31. Given that the events A and B such that $P(A) = \frac{1}{2}, P(A \cup B) = \frac{3}{5}$ and $P(B) = k$ find k if A and B are independent events.

PART-C

Answer any six questions : $(\mathbf{6 \times 3 = 18})$

32. Show that the relation R in the set $A = \{x/x \in Z,\ \ and\ 0 \le x \le 12\}$ given by $R = \{(a,b): |a - b|\ is\ multiple\ of\ 4\}$ is an equivalence relation
33. Prove that $cos^{-1}\frac{12}{13} + sin^{-1}\frac{3}{5} = sin^{-1}\frac{56}{65}$
34. Express the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ as sum of symmetric and skew-symmetric matrices
35. If $x = a(\theta + sin\theta)\ and\ y = a(1 - cos\theta)$ then prove that $\frac{dy}{dx} = tan\left(\frac{\theta}{2}\right)$
36. If $(cosx)^y = (cosy)^x$ then prove that $\frac{dy}{dx} = \frac{ytanx + log(cosy)}{xtany + log(cosx)}$
37. Prove that the function f given by $f(x) = cosx$ is
    (a) Strictly decreasing in $(0, \pi)$,
    (b) Strictly increasing in $(\pi, 2\pi)$,
38. Evaluate $\int xtan^{-1}x\, dx$
39. Find the equation of curve passing through the point $(0,-2)$ given that at any point (x, y) on the curve, the product of the slope of its tangent and y coordinate of the point is equal to the x coordinate of point
40. Show that the position vector of the point P which divides the line joining the points A and B having the position vectors $\vec{a}\ and\ \vec{b}$ internally in the ratio $m{:}\,n$ is $\frac{m\vec{b}+n\vec{a}}{m+n}$
41. Find unit vector perpendicular to each of the vectors $\vec{a} + \vec{b}\ and\ \vec{a} - \vec{b}$ where $\vec{a} = \hat{\imath} + \hat{\jmath} + \hat{k}$ and $\vec{b} = \hat{\imath} + 2\hat{\jmath} + 3\hat{k}$
42. A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six

PART-D

Answer any four questions : $(\mathbf{5 \times 4 = 20})$

43. Let $f: N \rightarrow Y$ be a function defined as $f(x) = 4x + 3$, where, $Y = \{y \in N : y = 4x + 3 \; for \; some \; x \in N\}$ Show that f is invertible. find the inverse of f.
44. If $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$ prove that $A^3 - 6A^2 + 5A + 11I = O$
45. Solve the following system of linear equations by matrix method

$x - y + 3z = 10$

$x - y - z = -2$

$2x + 3y + 4z = 4$

46. If $y = (tan^{-1}x)^2$ then show that $(x^2 + 1)^2 y_2 + 2x(x^2 + 1)y_1 = 2$
47. Find the integral of $\frac{1}{\sqrt{x^2 - a^2}}$ w.r.t x and hence evaluate $\int \frac{1}{\sqrt{4x^2 - 25}} dx$
48. Find the area of region bounded by ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ by the method of integration
49. Find the general solution of differential equation $x\frac{dy}{dx} - y = 2x^2$
50. Derive the Equation of the line in space through a point and parallel to the vector both in vector form and Cartesian form

PART-E

Answer the following questions :

51. a) Prove that $\int_0^a f(x)dx = \int_0^a f(a - x)dx$ and hence find the value of $\int_0^{\pi/2} \frac{\sqrt{sinx}}{\sqrt{sinx} + \sqrt{cosx}} dx$ (6M)

OR

b) Solve the following linear programming problem graphically: (6M)

Minimise and Maximise $Z = x + 2y$

subject to $x + 2y \geq 100$

$2x - y \leq 0$

$2x + y \leq 200$

$x, y \geq 0$

52. a) Find the value of a and b if $f(x) = \begin{cases} 5 & if \; x \leq 2 \\ ax + b & if \; 2 < x < 10 \\ 21 & if \; x \geq 10 \end{cases}$ is continuous function (4M)

OR

a) Show that the matrix $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$ satisfies the equation $A^2 - A + 2I = O$, when I is 2×2 identity matrix and O is 2×2 zero matrix. Using this equation, find inverse of matrix A (4M)

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PREPARATORY MODEL QUESTION PAPER - 05

AS PER NEW PATTERN 2023-2024

BASED ON SECOND 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 : $(\mathbf{15 \times 1 = 15})$

1. Let R be the relation in the set $\{1,2,3\}$ given by $R = \{(1,1),(2,2),(3,3),(1,3)\}$. Then which ordered pair to be added to R to make it the smallest equivalence relation
   a) (2,1) b) (3,2)
   c) (2,3) d) (3,1)

2. The function $f: R \to R$ is given by $f(x) = |x|, x \in R$ then f is
   a) one-one function b) onto function
   c) neither one-one nor onto function d) none of these

3. Domain of the function $f(x) = sec^{-1}x$ is
   a) $(-\infty,-1) \cup (1,\infty)$ b) $(-\infty,-1] \cup [1,\infty)$
   c) $(-\infty,-1) \cap (1,\infty)$ d) $(-\infty,-1] \cap [1,\infty)$

4. $A = [a_{ij}]_{m\times n}$ is a square matrix. If
   a) $m < n$ b) $m > n$
   c) $m = n$ d) none of these

5. The value of $\begin{vmatrix} cos15^0 & sin15^0 \\ sin75^0 & cos75^0 \end{vmatrix}$ is
   a) 1 b) 0
   c) 2 d) 3

6. If $y = x^{20}$ then $\frac{d^2y}{dx^2} =$
   a) $20x^{19}$ b) $20x^{18}$
   c) $380x^{18}$ d) $360x^{18}$

7. Which of the following is not true
   a) Every polynomial function is continuous b) Every constant function is continuous
   c) Every differentiable function is continuous d) Every continuous function is differentiable

8. The function f is given by $f(x) = x^2, x \in R$. The graph of the function is a parabola then the height of the graph at $x = -\frac{3}{2}$ is
   a) $-\frac{3}{2}$
   b) $-\frac{9}{4}$
   c) $\frac{3}{2}$
   d) $\frac{9}{4}$

9. The anti derivative of $\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)$ is
   a) $\frac{1}{3}x^{1/3} + 2x^{1/2} + C$
   b) $\frac{2}{3}x^{2/3} + \frac{1}{2}x^2 + C$
   c) $\frac{2}{3}x^{3/2} + 2x^{1/2} + C$
   d) $\frac{3}{2}x^{3/2} + \frac{1}{2}x^{1/2} + C$

10. $\int_1^{\sqrt{3}} \frac{dx}{1+x^2}$ is equals to
   a) $\frac{\pi}{3}$
   b) $\frac{2\pi}{3}$
   c) $\frac{\pi}{6}$
   d) $\frac{\pi}{12}$

11. Which of the following vector has same magnitude of $2\hat{\imath} + 3\hat{\jmath} - \hat{k}$ is
   a) $2\hat{\imath} - 3\hat{\jmath} + \hat{k}$
   b) $\frac{1}{2}\hat{\imath} + \frac{1}{3}\hat{\jmath} - \hat{k}$
   c) $\frac{2}{\sqrt{14}}\hat{\imath} + \frac{3}{\sqrt{14}}\hat{\jmath} - \frac{1}{\sqrt{14}}\hat{k}$
   d) $4\hat{\imath} + 6\hat{\jmath} - 2\hat{k}$

12. Identify the group of Scalar
   a) Velocity, Time, Volume
   b) Time, Volume, Force
   c) Density, Velocity, Speed
   d) Density, Time, Volume

13. If α,β and γ are direction angles of a directed line $\overrightarrow{OP}$ then direction cosines of a directed line $\overrightarrow{PO}$ are
   a) $\pi - cos\alpha, \pi - cos\beta, \pi - cos\gamma$
   b) $-cos\alpha, -cos\beta, -cos\gamma$
   c) $cos\alpha, cos\beta, cos\gamma$
   d) $-sin\alpha, -sin\beta, -sin\gamma$

14. In a linear programming problem, the objective function is always
   a) Cubic function
   b) Quadratic function
   c) Linear function
   d) Constant function

15. If A and B are independent events such that $P(A) = 0.3$ and P(B)= 0.6, then $P(A \text{ and not } B)$
   a) 0.18
   b) 0.12
   c) 0.42
   d) 0.28

II.Fill in the blanks by choosing the appropriate answer from those give in the bracket : $(\mathbf{5 \times 1 = 5})$

$$\left(\boldsymbol{not\ defined},\ \mathbf{3},\ \mathbf{2},\ \mathbf{7},\ \frac{\mathbf{7}}{\mathbf{8}},\ \mathbf{1}\right)$$

16. If $2tan^{-1}(cosx) = \tan^{-1}(2cosecx)$ then the value of $cotx$ is ………………
17. If $\begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix} = \begin{vmatrix} x & 3 \\ 2x & 5 \end{vmatrix}$, then the value of x is ………………
18. The degree of differential equation $\left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right)^2 + sin\left(\frac{dy}{dx}\right) + 1 = 0$ is ………………
19. The line passing through the points $(4, \lambda, 8),(2,3,4)$is parallel to the line passing through the points $(-1, -2,1),(1,2,5)$. Then the value of λ is ………………
20. A die is tossed thrice. The probability of getting an odd numbers at least once is ………………

PART-B

Answer any six questions : $(\mathbf{6 \times 2 = 12})$

21. Write $cot^{-1}\left(\frac{1}{\sqrt{x^2-1}}\right), x > 1$ in simplest form
22. Find the equation of line joining $(3,2)$ *and* $(-1,-3)$ using determinants.
23. Differentiate x^{sinx} , $x > 0$ w.r.t x
24. Find the rate of change of the area of a circle with respect to its radius *r* when *r* = 6 cm.
25. Find the minimum value of the function *f* given by $f(x) = -|x+1| + 3, x \in R$
26. Evaluate $\int cos6x\sqrt{1+sin6x}\,dx$
27. Integrate xe^x w.r.t x
28. Find the projection of vector $\vec{a} = 2\hat{\imath} + 3\hat{\jmath} + 2\hat{k}$ on vector $\vec{b} = \hat{\imath} + 2\hat{\jmath} + \hat{k}$
29. Find the vector equation of a line which passes through the point (1,2,3) and parallel to the vector $3\hat{\imath} + 2\hat{\jmath} - 2\hat{k}$
30. If A and B are the two independent events, then prove that the events A and B' are independent
31. Assume that each born child is equally likely to be a boy or girl. If a family has two children. What is the Conditional probability of both are girls given that the youngest is a girl?

PART-C

Answer any six questions : $(\mathbf{6 \times 3 = 18})$

32. Let T be the set of all triangles in a plane with R is a relation in T is given by $R = \{(T_1, T_2): T_1 \text{ is congruent to } T_2\}$Show that R is an equivalence relation
33. Prove that $sin^{-1}\frac{8}{17} + sin^{-1}\frac{3}{5} = tan^{-1}\frac{77}{36}$
34. For the matrix $A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$, verify that
    (a) $A + A'$ is symmetric matrix, and
    (b) $A - A'$ is skew symmetric matrix
35. Find $\frac{dy}{dx}$, if $xy + y^2 = tanx + y$
36. If $x = acos^3\theta$ *and* $y = asin^3\theta$ prove that $\frac{dy}{dx} = -\sqrt[3]{\frac{y}{x}}$
37. Find the intervals in which the function f given by $f(x) = x^2 - 4x + 6$ is
    (a) decreasing (b) increasing
38. Evaluate $\int \frac{cosx}{(1-sinx)(2-sinx)}dx$
39. Find the general solution of differential equation $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$
40. Show that the position vector of the point P which divides the line joining the points A and B having the position vectors $\vec{a}$ *and* $\vec{b}$ internally in the ratio $m:n$ is $\frac{m\vec{b}+n\vec{a}}{m+n}$
41. Find the vector perpendicular to each of the vectors $\vec{a} = 2\hat{\imath} + \hat{\jmath} + 3\hat{k}, \vec{b} = 3\hat{\imath} + 5\hat{\jmath} - 2\hat{k}$ which has magnitude 10 units
42. Bag I contains 3 red and 4 black balls and while another bag II contains 5 red and 6 black balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was drawn from bag II

PART-D

Answer any four questions : $(\mathbf{5 \times 4 = 20})$

43. Define Bijective function. Check the injectivity and surjectivity of the function $f: R \rightarrow R$ defined by $f(x) = 3 - 4x$.
44. If $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}, B = \begin{bmatrix} 2 & 0 \\ 1 & 3 \end{bmatrix}$ $and\ C = \begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix}$
calculate AC, BC and $(A+B)C$. Also verify $(A+B)C = AC + BC$
45. Solve the following system of linear equations by matrix method
$$3x - 2y + 3z = 8$$
$$2x + y - z = 1$$
$$4x - 3y + 2z = 4$$
46. If $y = e^{a\cos^{-1}x}$, $-1 \leq x \leq 1$ then prove that $(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - a^2y = 0$
47. Find the integral of $\frac{1}{\sqrt{x^2+a^2}}$ w.r.t x and hence evaluate $\int \frac{1}{\sqrt{x^2+2x+3}} dx$
48. Find the area of region bounded by ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ by the method of integration
49. Find the general solution of differential equation $\frac{dy}{dx} + \frac{2xy}{1+x^2} = \frac{4x^2}{1+x^2}$
50. Derive the vector equation for Shortest distance between two skew lines

PART-E

Answer the following questions :

51. a) Prove that $\int_{-a}^{a} f(x)dx = \begin{cases} 2\int_0^a f(x)dx & if\ f\ is\ even\ function \\ 0 & if\ f\ is\ odd\ function \end{cases}$ (6M)

and hence find the value of $\int_{-1}^{1} \sin^5 x \cos^4 x\, dx$,

OR

b) Solve the following linear programming problem graphically: (6M)

Maximise and minimise $Z = 3x + 2y$

subjected to $x + 2y \leq 10$

$3x + y \leq 15$

$x \geq 0, y \geq 0$

52. a) If $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$, prove that the equation $A^2 - 4A + I = O$,

where $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $O = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$. Using this equation find A^{-1} (4M)

OR

b) Find the relationship between a and b if $f(x) = \begin{cases} ax + 1 & if\ x \leq 3 \\ bx + 3 & if\ x > 3 \end{cases}$ is continuous at $x = 3$ (4M)

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PREPARATORY MODEL QUESTION PAPER - 06

AS PER NEW PATTERN 2023-2024

BASED ON SECOND 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 : $(\mathbf{15 \times 1 = 15})$

1. The relation R in the set {1,2,3} given by R={(1,1),(2,3),(3,2),(3,3)} is
a) Symmetric only
b) Symmetric and transitive
c) Transitive only
d) Transitive but not symmetric

2. The function $f: R \to R$ is given by $f(x) = [x]$, $x \in R$ then f is
a) one-one function
b) onto function
c) neither one-one nor onto function
d) none of these

3. Domain of the function $f(x) = cosec^{-1}x$ is
a) $(-\infty, -1) \cup (1, \infty)$
b) $(-\infty, -1] \cup [1, \infty)$
c) $(-\infty, -1) \cap (1, \infty)$
d) $(-\infty, -1] \cap [1, \infty)$

4. For 2×2 matrix $A = [a_{ij}]$ whose elements are given by $a_{ij} = \frac{(i+j)^2}{2}$ then A is
a) $\begin{bmatrix} 1 & 9/2 \\ 9/2 & 8 \end{bmatrix}$
b) $\begin{bmatrix} 2 & 9/2 \\ 9/2 & 4 \end{bmatrix}$
c) $\begin{bmatrix} 2 & 9/2 \\ 9/2 & 8 \end{bmatrix}$
d) $\begin{bmatrix} 1 & 9/2 \\ 9/2 & 2 \end{bmatrix}$

5. If $\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$, then the value of x is equal to.
a)2
b) 4
c) 8
d) $\pm 2\sqrt{2}$

6. The function $f(x) = |x + 3|$ is not differentiable at $x =$
a) -3
b) 1
c) 2
d) 3

7. The derivative of $sin^{-1}x$ exists in the interval
a) $[-1,1]$
b) $(-1,1)$
c) R
d) $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$

8. The function f is given by $f(x) = x^2, x \in R$. The graph of the function is a parabola then the height of the graph at $x = -\frac{1}{2}$ is
   a) $-\frac{1}{2}$ b) $-\frac{1}{4}$
   c) $\frac{1}{2}$ d) $\frac{1}{4}$

9. The anti derivative of $\frac{2x}{1+x^2}$ is
   a) $2tan^{-1}x + C$ b) $log|1 + x^2| + C$
   c) $tan^{-1}x + C$ d) $2log|1 + x^2| + C$

10. The value of $\int_{-\pi/2}^{\pi/2} sin^7 x\, dx$
    a) $\frac{\pi}{3}$ b) $\frac{2\pi}{3}$
    c) 0 d) $\frac{\pi}{12}$

11. The magnitude of the vector $\frac{1}{\sqrt{3}}\hat{\imath} + \frac{1}{\sqrt{3}}\hat{\jmath} - \frac{1}{\sqrt{3}}\hat{k}$ is
    a) 3 b) $\sqrt{3}$
    c) $\frac{1}{\sqrt{3}}$ d) 1

12. Identify the group of Vectors
    a) Velocity, Displacement, Volume b) Displacement, Velocity, Force
    c) Density, Velocity, Force d) Time, Volume, Force

13. If a line makes angle $90^0, 60^0$ *and* 30^0 with positive direction of X, Y and Z-axis respectively, then its direction cosines are
    a) $1, \frac{1}{2}, \frac{\sqrt{3}}{2}$ b) $0, \frac{\sqrt{3}}{2}, \frac{1}{2}$
    c) $1, \frac{\sqrt{3}}{2}, \frac{1}{2}$ d) $0, \frac{1}{2}, \frac{\sqrt{3}}{2}$

14. The corner points of the feasible region determined by the system of linear constraints are (0,20), (0,10), (5,5) and (15,15) The maximum value of the objective function $Z = ax + by$ is occur at both (0,20) and (15,15) then the condition for a and b is
    a) $a = b$ b) $a = 2b$
    c) $a = 3b$ d) $b = 3a$

15. Let E and F be events of a sample space S of an experiment, then $P(E/F) + P(E'/F)$ is
    a) $P(E)$ b) $P(F)$
    c) $P(S)$ d) $P(E/F)$

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

$$\left(\pm 5,\ 4, -1,\ \frac{9}{50},\ \frac{7}{25}, 1\right)$$

16. The value of $sin\left[\frac{\pi}{3} - sin^{-1}\left(-\frac{1}{2}\right)\right]$ is ………………
17. If A is a square matrix of order 3 and $|adjA| = 25$ then the value of $|A|$ is ………………
18. The order of the differential equation $\frac{d^4y}{dx^4} + sin(y''') = 0$ is ………………
19. The line passing through the points $(1, \lambda, 2)$,$(3,4,-2)$is perpendicular to the line passing through the points (0,3,2),(3,5,6). Then the value of λ is ………………
20. If A and B are independent events such that $P(A) = 0.3$ and P(B)= 0.6, then $P(not\ A\ and\ not\ B)$ is ………………

PART-B

Answer any six questions : $(\mathbf{6 \times 2 = 12})$

21. Find the value of $tan^{-1}(\sqrt{3}) - cot^{-1}(-\sqrt{3})$
22. If the area of triangle with vertices $(2,-6),(5,4)$ and $(k,4)$ is 35 sq units. Find the value of k using determinants
23. Find $\frac{dy}{dx}$ if $ax + by^2 = cosy$
24. A stone is dropped into a quiet lake and waves move in circles at a speed of 4 cm per second. At the instant, when the radius of the circular wave is 10 cm, how fast is the enclosed area increasing?
25. Find the local maximum value of the function $g(x) = x^3 - 3x$
26. Evaluate $\int \frac{sinx}{(1+cosx)^2}dx$
27. Evaluate $\int xsinx\, dx$
28. Find the projection of vector $\vec{a} = 3\hat{\imath} - 5\hat{\jmath} + 7\hat{k}$ on vector $\vec{b} = \hat{\imath} + 3\hat{\jmath} + 2\hat{k}$
29. Find the equation of a line which passes through the point $(5,-2,4)$ and parallel to the vector $2\hat{\imath} - \hat{\jmath} + 3\hat{k}$ in Cartesian form
30. If A and B are the two independent events, then prove that the probability of occurrence of at least one of A and B is given by $1 - P(A')P(B')$
31. Two coins are tossed once, find $P(E/F)$ where E: no tail appears, F: no head appears

PART-C

Answer any six questions : $(\mathbf{6 \times 3 = 18})$

32. Show that the relation R in the set $A = \{1,2,3,4,5,6,7\}$ defined by $R = \{(a,b): both\ a\ and\ b\ are\ either\ odd\ or\ even\}$ is an equivalence relation
33. Write $tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right), |x| < a$ in simplest form
34. Express the matrix $A = \begin{bmatrix} 1 & 5 \\ -1 & 2 \end{bmatrix}$ as sum of Symmetric and Skew-symmetric matrices
35. Differentiate x^{sinx} , $x > 0$ w.r.t x
36. Find $\frac{dy}{dx}$ If $y = a^{\left(t+\frac{1}{t}\right)}$ and $x = \left(t + \frac{1}{t}\right)^a$ where a is positive constant
37. Find the interval in which $f(x) = x^2e^{-x}$ is increasing.
38. Evaluate $\int \frac{1}{(x+1)(x+2)}dx$
39. Find the particular solution of differential equation $cos\left(\frac{dy}{dx}\right) = a$ where $y = 2, x = 0$.
40. If a unit vector $\vec{a}$ makes an angles $\frac{\pi}{3}$ with $\hat{\imath}$, $\frac{\pi}{4}$ with $\hat{\jmath}$ and an acute angle θ with $\hat{k}$ find θ and hence find components of $\vec{a}$
41. Find the area of parallelogram whose adjacent sides are given by the vectors $\vec{a} = \hat{\imath} - \hat{\jmath} + 3\hat{k}$ and $\vec{b} = 2\hat{\imath} - 7\hat{\jmath} + \hat{k}$
42. In answering a question on a multiple choice test, a student either known the answer or guesses. Let 3/4 be the probability that he knows the answer and 1/4 be the probability that he guesses. Assuming that a student who guesses at the answer will be correct with probability 1/4 . what is the probability that the student knows the answer given that he answered it correctly?

PART-D

Answer any four questions : **$(5 \times 4 = 20)$**

43. Verify whether the function $f: R - \{3\} \to R - \{1\}$ defined by $f(x) = \frac{x-2}{x-3}$ is one-one and onto or not. Give reason.

44. If $A = \begin{bmatrix} -1 & 2 & 3 \\ 5 & 7 & 9 \\ -2 & 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -4 & 1 & -5 \\ 1 & 2 & 0 \\ 1 & 3 & 1 \end{bmatrix}$ then verify that i) $(A+B)^I = A^I + B^I$ ii) $(A-B)^I = A^I - B^I$

45. Solve the following system of linear equation by matrix method

$$x - y + z = 4$$
$$2x + y - 3z = 0$$
$$x + y + z = 2$$

46. If $y = Ae^{mx} + Be^{nx}$, show that $\frac{d^2y}{dx^2} - (m+n)\frac{dy}{dx} + mny = 0$

47. Find the integral $\sqrt{x^2 + a^2}$ w.r.t x and hence evaluate $\int \sqrt{1+x^2}dx$

48. Find the area of region of circle $x^2 + y^2 = a^2$ by the method of integration

49. Solve $\frac{dy}{dx} + (secx)y = tanx$, $0 \le x \le \frac{\pi}{2}$

50. Derive the vector equation for Shortest distance between two skew lines

PART-E

Answer the following questions :

51. a) Prove that $\int_a^b f(x)dx = \int_a^b f(a+b-x)dx$ and hence find the value of $\int_1^3 \frac{\sqrt{x}}{\sqrt{4-x}+\sqrt{x}}dx$ (6M)

OR

b) Solve the following linear programming problem graphically: (6M)

Minimise $Z = -3x + 4y$

Subject to $x + 2y \le 8$

$3x + 2y \le 12$

$x \ge 0, y \ge 0$

52. a) Show that the matrix $A = \begin{bmatrix} 1 & 2 \\ 4 & 1 \end{bmatrix}$ satisfies the equation $A^2 - 2A - 7I = O$, when I is 2×2 identity matrix and O is 2×2 zero matrix. Using this equation, find inverse of matrix A (4M)

OR

b) Find the value of λ $f(x) = \begin{cases} \lambda\,(x^2 - 2x) & if\ x \le 0 \\ 4x + 1 & if\ x > 0 \end{cases}$ is continuous at $x = 0$? (4M)

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PREPARATORY MODEL QUESTION PAPER - 07

AS PER NEW PATTERN 2023-2024

BASED ON SECOND 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 : $(\mathbf{15 \times 1 = 15})$

1. Let R be the relation in the set $\{1,2,3,4\}$ given by $R = \{(1,2), (2,2), (1,1), (4,4), (1,3), (3,3), (3,2)\}$. Then R is
a) reflexive and symmetric but not transitive. b) reflexive and transitive but not symmetric.
c) symmetric and transitive but not reflexive. d) equivalence relation

2. The number of all one-one functions from set $A = \{1,2,3\}$ to itself, is
a) 8 b) 4
c) 6 d) 3

3. Domain of the function $f(x) = sec^{-1}x$ is
a) $(-\infty, -1) \cup (1, \infty)$ b) $(-\infty, -1] \cup [1, \infty)$
c) $(-\infty, -1) \cap (1, \infty)$ d) $(-\infty, -1] \cap [1, \infty)$

4. If $A = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ then AB is
a) $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ b) $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$
c) $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$

5. The value of $\begin{vmatrix} x & x+1 \\ x-1 & x \end{vmatrix}$ is
a) 1 b) -1
c) $\pm\sqrt{2}$ d) x^2

6. The function $f(x) = |x - 1|$ is
a) continuous and not differentiable at $x = 1$ b) continuous and differentiable at $x = 1$
c) not continuous and not differentiable at $x = 1$ d) not continuous and differentiable at $x = 1$

7. The derivative of $sin(x^2)$ w.r.t x
a) $cos(x^2)$ b) $-cos(x^2)$
c) $2xcos(x^2)$ d) $-2xcos(x^2)$

8. The minimum value of the function $f(x) = |sin(4x) + 3|$ is
   a) 2 b) 3
   c) 4 d) 5

9. The value of $\int \sqrt{1 + cos2x}\, dx$ is
   a) $-\sqrt{2}sinx + C$ b) $\sqrt{2}cosx + C$
   c) $\sqrt{2}sinx + C$ d) $-\sqrt{2}cosx + C$

10. The value of $\int_0^1 \frac{1}{\sqrt{1-x^2}} dx$
    a) 0 b) $\frac{3\pi}{2}$
    c) $-\frac{\pi}{2}$ d) $\frac{\pi}{2}$

11. If $\vec{a}$ is a non zero vector of magnitude a and $\mu\vec{a}$ is a unit vector, then the value of μ is
    a) ± 1 b) $\pm a$
    c) 0 d) $\pm\frac{1}{a}$

12. The vector component form of the vector joining the points $A(1, -2, 1)$ and $B(-2, 4, 5)$ from A to B are
    a) $-\hat{\imath}$, $2\hat{\jmath}$ and $6\hat{k}$ b) $-3\hat{\imath}$, $6\hat{\jmath}$ and $4\hat{k}$
    c) $3\hat{\imath}$, $-6\hat{\jmath}$ and $-4\hat{k}$ d) $-2\hat{\imath}$, $-8\hat{\jmath}$ and $5\hat{k}$

13. If l,m and n are direction cosines of a directed line $\overrightarrow{OP}$ then direction cosines of a directed line $\overrightarrow{PO}$ are
    a) $l - m, m - n, n - l$ b) $-l, -m, -n$
    c) l, m, n d) $\frac{1}{l}, \frac{1}{m}, \frac{1}{n}$

14. In Linear programming problem, non negative constraints
    a) $x \le 0, y \ge 0$ b) $x \ge 0, y \ge 0$
    c) $x \le 0, y \le 0$ d) $None\ of\ these$

15. If $P(A) = \frac{1}{2}$, P(B)= 0 then $P(A/B)$ is
    a) 0 b) $\frac{1}{2}$
    c) not defined d) 1

II.Fill in the blanks by choosing the appropriate answer from those give in the bracket : $(\mathbf{5 \times 1 = 5})$

$$\left(-6,\ 5,\ \frac{\pi}{4},\ \frac{3\pi}{4},\ \frac{1}{2}, -\frac{1}{\sqrt{2}}\right)$$

16. The value of $tan^{-1}\left(tan\frac{3\pi}{4}\right)$ is ………………
17. The minor of an element 6 in $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$ is ………………
18. The sum of order and degree of the differential equation $\left(\frac{d^3y}{dx^3}\right)^2 + \left(\frac{d^2y}{dx^2}\right)^3 + \frac{dy}{dx} + y = 0$ is ………………
19. If a line makes an angles $90^0, 135^0\ and\ 45^0$ with the X, Y and Z-axis respectively, the y coordinate of direction cosine of Y-axis is ………………
20. Probability of solving specific problem independently by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. If both try to solve the problem independently, the probability that exactly one of them solves the problem is ………………

PART-B

Answer any six questions : $(\mathbf{6 \times 2 = 12})$

21. Prove that $sin(tan^{-1}x) = \frac{x}{\sqrt{1+x^2}}$, $|x| < 1$
22. Find the value of k, if the area of triangle is 4 sq units and vertices are $(k, 0), (4,0)$ and $(0,2)$ using determinants
23. Find $\frac{dy}{dx}$ if $x^2 + xy + y^2 = 100$
24. A stone is dropped into a quiet lake and waves move in circles at a speed of 5 cm per second. At the instant, when the radius of the circular wave is 8 cm, how fast is the enclosed area increasing?
25. Find the intervals in which the function f given by $f(x) = x^2 - 4x + 6$ is decreasing
26. Evaluate $\int \frac{sin(tan^{-1}x)}{x^2+1} dx$
27. Evaluate $\int e^x \left(\frac{1+sinx}{1+cosx}\right) dx$
28. Find the projection of vector $\vec{a} = \hat{\imath} + 2\hat{\jmath} + \hat{k}$ on vector $\vec{b} = 2\hat{\imath} + 3\hat{\jmath} + 2\hat{k}$
29. Find the angle between two pair of lines $\frac{x+3}{3} = \frac{y-1}{5} = \frac{z+3}{4}$ and $\frac{x+1}{1} = \frac{y-4}{1} = \frac{z-5}{2}$
30. If A and B are the two events, such that $P(A/B) = P(B/A)$ then prove that $P(A) = P(B)$
31. A fair die is rolled. Consider the event $E = \{1,3,5\}, F = \{2,3\}$ and $G = \{2,3,4,5\}$ Find $P(E/F)$ and $P(E/G)$

PART-C

Answer any six questions : $(\mathbf{6 \times 3 = 18})$

32. Let L be the set of all lines in a XY plane and R is a relation in L is given by
$R = \{(L_1, L_2): L_1\ is\ parallel\ to\ L_2\}$ Show that R is an equivalence relation
33. Solve $sin^{-1}(1-x) - 2sin^{-1}x = \frac{\pi}{2}$
34. If A and B are the symmetric matrices of same order then show that AB is symmetric if and only if A and B are commute. that is $AB = BA$
35. Differentiate $\left(x + \frac{1}{x}\right)^x$ with respect to x
36. Find $\frac{dy}{dx}$ if $x = cos\theta - cos2\theta\ and\ y = sin\theta - sin2\theta$
37. Find the two positive numbers whose sum is 15 and the sum of whose squares is minimum
38. Evaluate $\int \frac{x}{(x-1)(x-2)} dx$
39. Find the general solution of differential equation $og\left(\frac{dy}{dx}\right) = 3x + 4y$.
40. Three vectors $\vec{a}, \vec{b}\ and\ \vec{c}$ satisfy the condition $\vec{a} + \vec{b} + \vec{c} = \vec{0}$
evaluate $\mu = \vec{a}\cdot\vec{b} + \vec{b}\cdot\vec{c} + \vec{c}\cdot\vec{a}$ if $|\vec{a}| = 1, |\vec{b}| = 4, |\vec{c}| = 2$
41. Find the area of parallelogram whose adjacent sides are given by the vectors
$\vec{a} = 3\hat{\imath} + \hat{\jmath} + 4\hat{k}$ and $\vec{b} = \hat{\imath} - \hat{\jmath} + \hat{k}$
42. Two groups are competing for the position on the Board of directors of a corporation. The probabilities that the first and the second groups will win are 0.6 and 0.4 respectively. Further, if the first group wins, the probability of introducing a new product is 0.7 and the corresponding probability is 0.3 if the second group wins. Find the probability that the new product introduced was by the second group.

PART-D

Answer any four questions : $(\mathbf{5\times 4 = 20})$

43. Define bijective function. Check the injectivity and surjectivity of the function $f: R \to R$ defined by $f(x) = 3 - 4x$. Is it a bijective function?
44. If $A = \begin{bmatrix} 3 & \sqrt{3} & 2 \\ 4 & 2 & 0 \end{bmatrix}$ *and* $B = \begin{bmatrix} 2 & -1 & 2 \\ 1 & 2 & 4 \end{bmatrix}$ then show that $(A - B)' = A' - B'$
45. Solve the following system of linear equation by matrix method

    $2x + 3y + 3z = 5$

    $x - 2y + z = -4$

    $3x - y - 2z = 3$
46. If $e^y(x+1) = 1$ prove that $\frac{dy}{dx} = -e^y$ and hence prove that $\frac{d^2y}{dx^2} = \left(\frac{dy}{dx}\right)^2$
47. Find the integral of $\sqrt{a^2 - x^2}$ w.r.t x and hence evaluate $\int \sqrt{5 - x^2 + 2x}\, dx$
48. Find the area bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ by the method of integration
49. Find the general solution of differential equation $ydx - (x + 2y^2)dy = 0$
50. Derive the Equation of the line in space passing through a point and parallel to the vector Both in Vector and Cartesian form

PART-E

Answer the following questions :

51. a) Prove that $\int_0^{2a} f(x)dx = \begin{cases} 2\int_0^a f(x)dx & \text{if } f(2a - x) = f(x) \\ 0 & \text{if } f(2a - x) = -f(x) \end{cases}$ and hence find $\int_0^{2\pi} cos^5 x\, dx$ (6M)

    OR

    b) Solve the following linear programming problem graphically: (6M)

    Minimise $Z = 200x + 500y$

    Subject to $x + 2y \geq 10$

    $3x + 4y \leq 24$

    $x \geq 0, y \geq 0$
52. a) If $A = \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$, then find the numbers a and b such that $A^2 + aA + bI = O$ then Using this equation, find inverse of matrix A (4M)

    OR

    b) Find the value of k if $f(x) = \begin{cases} kx + 1 & if\ x \leq 5 \\ 3x - 5 & if\ x > 5 \end{cases}$ is continuous at $x = 5$ (4M)

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MODEL QUESTION PAPER (BY P.U.E BOARD)

AS PER NEW PATTERN 2023-2024

SECOND PUC MODEL QUESTION PAPER 2023-2024
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 : $(\mathbf{15 \times 1 = 15})$

1. The relation R in the set {1,2,3} given by $R = \{(1,2),(2,1)\}$ is
   a) Reflexive b) Symmetric
   c) Transitive d) Equivalence relation

2. If $f: R \to R$ be defined as $f(x) = x^4$, then the function f is
   a) one-one and onto b) many-one and onto
   c) one-one but not onto d) neither one-one nor onto

3. The principal value branch of $cot^{-1}x$ is
   a) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$ b) $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$
   c) $[0,\pi]$ d) $(0,\pi)$

4. The number of all possible matrices of order 3×3 with each entries 0 or 1 is
   a) 27 b) 18
   c) 81 d) 512

5. Let A be a non singular matrix of order 3×3 and $|adjA| = 25$ then possible value of $|A|$ is
   a) 625 b) 25
   c) 5 d) 125

6. Which of the following x belongs to domain of the greatest integer function $f(x) = [x]$, $0 < x < 3$ is not differentiable
   a) 2 and 3 b) 1 and 2
   c) 0 and 2 d) 1 and 3

7. If $y = log_7 2x$ then $\frac{dy}{dx}$ is
   a) $\frac{1}{xlog7}$ b) $\frac{1}{7logx}$
   c) $\frac{logx}{7}$ d) $\frac{7}{log7}$

8. The point of inflection of the function $y = x^3$ is
   a) $(2,8)$
   b) $(1,1)$
   c) $(0,0)$
   d) $(-3,-27)$

9. $\int sin2x\, dx$ is
   a) $-\frac{sin2x}{2} + c$
   b) $-\frac{cos2x}{2} + c$
   c) $\frac{cos2x}{2} + c$
   d) $\frac{sin2x}{2} + c$

10. $\int e^x \left(\frac{1}{x} - \frac{1}{x^2}\right) dx$ is
    a) $e^{-x}\left(\frac{1}{x}\right) + C$
    b) $e^{-x}\left(\frac{1}{x^2}\right) + C$
    c) $e^{x}\left(\frac{1}{x}\right) + C$
    d) $e^{x}\left(\frac{1}{x^2}\right) + C$

11. If θ is the angle between any two vectors $\vec{a}$ and $\vec{b}$, then $|\vec{a} \cdot \vec{b}| = |\vec{a} \times \vec{b}|$ when $tan\theta$ is equal to.
    a) 1
    b) $\frac{1}{\sqrt{3}}$
    c) $\sqrt{3}$
    d) 0

12. Unit vector in the direction of $\vec{a} = 2\hat{\imath} + 3\hat{\jmath} + \hat{k}$ *is*
    a) $\frac{2\hat{\imath}+3\hat{\jmath}+\hat{k}}{14}$
    b) $\frac{2\hat{\imath}-3\hat{\jmath}+\hat{k}}{\sqrt{14}}$
    c) $\frac{2\hat{\imath}+3\hat{\jmath}+\hat{k}}{\sqrt{14}}$
    d) $\frac{2\hat{\imath}+3\hat{\jmath}-\hat{k}}{14}$

13. If the direction cosines l, m, n of a line are $0, \frac{1}{2}, \frac{\sqrt{3}}{2}$ then the angle made by the line with the positive direction of y-axis is
    a) 60^0
    b) 30^0
    c) 90^0
    d) 45^0

14. In a linear programming problem, the objective function is always
    a) a cubic function
    b) a quadratic function
    c) a linear function
    d) a constant function

15. If A and B are two non empty events such that $P(A/B) = P(B/A)$ and $A \cap B \neq \phi$ then
    a) $A \subset B$ but $A \neq B$
    b) $A = B$
    c) $B \subset A$ but $A \neq B$
    d) $P(A) = P(B)$

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

$$\left(\mathbf{0},\ \mathbf{1},\ \mathbf{4},\ \frac{\mathbf{1}}{\mathbf{36}},\ \mathbf{7},\ \frac{\mathbf{1}}{\mathbf{6}}\right)$$

16. The value of $sin\left[\frac{\pi}{3} - sin^{-1}\left(-\frac{1}{2}\right)\right]$ is ………………
17. A square matrix A is a singular matrix if $|A|$ is ………………
18. The order of the differential equation $\frac{d^4y}{dx^4} + sin(y''') = 0$ is ………………
19. The lines $\frac{x-5}{k} = \frac{y+2}{-5} = \frac{z}{1}$ and $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ are perpendicular, then k is ………………
20. The probability of obtaining an even prime number on each die, when a pair of dice is rolled is ………………

PART-B

Answer any six questions : $(\mathbf{6 \times 2 = 12})$

21. Prove that $2sin^{-1}\left(\frac{3}{5}\right) = tan^{-1}\left(\frac{24}{7}\right)$
22. Find the equation of line joining $(1,2)$, $(3,6)$ using determinant method.
23. Find $\frac{dy}{dx}$ if $y + siny = cosx$.
24. Find the rate of change of the area of a circle per second with respect to its radius *r* when *r* = 3 cm.
25. Find local minimum value of the function *f* given by $f(x) = 3 + |x|, x \in R$
26. Find $\int \frac{dx}{(x+1)(x+2)}$
27. Evaluate $\int_0^{\pi/2}\left[sin^2\left(\frac{x}{2}\right) - cos^2\left(\frac{x}{2}\right)\right]dx$
28. Find the projection of the vector $\vec{a} = 2\hat{\imath} + 3\hat{\jmath} + 2\hat{k}$ on the vector $\vec{b} = \hat{\imath} + 2\hat{\jmath} + \hat{k}$.
29. Find the angle between two pair of lines given by
    $\vec{r} = 3\hat{\imath} + 2\hat{\jmath} - 4\hat{k} + \lambda\left(\hat{\imath} + 2\hat{\jmath} + 2\hat{k}\right)$ and $\vec{r} = 5\hat{\imath} - 2\hat{\jmath} + \mu\left(3\hat{\imath} + 2\hat{\jmath} + 6\hat{k}\right)$
30. A fair die is rolled. Consider events $E = \{1,3,5\}$, $F = \{2,3\}$ find $P(E/F)$
31. If A and B are two events such that $P(A) = \frac{1}{4}, P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{8}$,
    Find $P(not\ A\ and\ not\ B)$.

PART-C

Answer any six questions : $(\mathbf{6 \times 3 = 18})$

32. Show that the relation R in the set $A = \{1,2,3,4,5\}$ given by
    $R = \{(a,b): |a - b|\ is\ even\}$ is an equivalence relation
33. Write $tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right), x \neq 0$ in simplest form
34. Express $A = \begin{bmatrix} 3 & 5 \\ 1 & -1 \end{bmatrix}$ as the sum of a symmetric and a skew-symmetric matrix
35. Differentiate $sin^2x\ w.r.t\ e^{cosx}$
36. Differentiate x^{sinx} , $x > 0$ with respect to x
37. Find the interval in which the function $f(x) = 10 - 6x - 2x^2$ is increasing
38. Evaluate $\int xsin^{-1}x\,dx$
39. Find the equation of curve through the point $(-2,3)$ given that the slope of the tangent at any point (x, y) is $\frac{2x}{y^2}$
40. Show that the position vector of the point P which divides the line joining the points A and B having the position vectors $\vec{a}\ and\ \vec{b}$ internally in the ratio $m\!:\!n$ is $\frac{m\vec{b}+n\vec{a}}{m+n}$
41. Find unit vector perpendicular to each of the vectors $\vec{a} + \vec{b}\ and\ \vec{a} - \vec{b}$
    where $\vec{a} = 3\hat{\imath} + 2\hat{\jmath} + 2\hat{k}$ and $\vec{b} = \hat{\imath} + 2\hat{\jmath} - 2\hat{k}$
42. A bag contains 4 red and 4 black balls, another bag contains 2 red and 6 black balls. One of the two bags is selected at random and a ball is drawn from the bag which is found to be red. Find the probability that the ball is drawn from the first bag

PART-D

Answer any four questions : $(\mathbf{5 \times 4 = 20})$

43. Let $f: N \to Y$ be a function defined as $f(x) = 4x + 3$, where, $Y = \{y \in N : y = 4x + 3 \; for \; some \; x \in N\}$ Show that f is invertible. find the inverse of f.

44. If $A = \begin{bmatrix} 0 & 6 & 7 \\ -6 & 0 & 8 \\ 7 & -8 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix}$ $and\ C = \begin{bmatrix} 2 \\ -2 \\ 3 \end{bmatrix}$
Calculate AC, BC and $(A+B)C$. Verify that $(A+B)C = AC + BC$

45. Solve the following system of linear equation by matrix method
$2x - 3y + 5z = 11$
$3x + 2y - 4z = -5$
$x + y - 2z = -3$

46. If $y = 3\cos(logx) + 4\sin(logx)$ show that $x^2y_2 + xy_1 + y = 0$

47. Find the integral of $\frac{1}{x^2 - a^2}$ with respect to x and hence evaluate $\int \frac{dx}{x^2 - 16}$

48. Find the area of region bounded by ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ by the method of integration

49. Find the general solution of differential equation $x\frac{dy}{dx} + 2y = x^2 logx, (x \neq 0)$

50. Derive the Equation of the line in space through a point and parallel to the vector both in vector form and Cartesian form

PART-E

Answer the following questions :

51. a) Prove that $\int_{-a}^{a} f(x)dx = \begin{cases} 2\int_0^a f(x)dx & if\ f\ is\ even\ function \\ 0 & if\ f\ is\ odd\ function \end{cases}$ (6M)

and hence evaluate $\int_{-\pi/2}^{\pi/2} sin^7 x\, dx$

OR

b) Solve the following linear programming problem graphically: (6M)
Minimise $Z = 200x + 500y$
Subject to $x + 2y \geq 10$
$3x + 4y \leq 24$
$x \geq 0, y \geq 0$

52. a) Find the value of k if $f(x) = \begin{cases} \frac{kcosx}{\pi - 2x} & if\ x \neq \pi/2 \\ 3 & if\ x = \pi/2 \end{cases}$ is continuous at $x = \pi/2$ (4M)

OR

b) Show that the matrix $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ satisfies the equation $A^2 - 4A + I = O$, where I is 2×2 identity matrix and O is 2×2 zero matrix. Using this equation, find A^{-1} (4M)

AS PER NEW PATTERN 2023-2024

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FEATURES OF THE BOOK PUC II YEAR MATHEMATICS

- **Blue print** of the Question Paper and **Question Paper Pattern**
- Chapter wise detailed solutions of
  - **Multiple Choice Questions (MCQ)**
- Chapter wise detailed solutions of
  - **Fill in the Blanks (FB)**
- Chapter wise Question Papers (Test Papers)
  - **For FIRST UNIT TEST and SECOND UNIT TEST**
  - **PROJECTS/ACTIVITY/ASSIGNEMENT**
- **Passing Package and Scoring Package**
- Different Set of Question Papers (Prepared by experts)
  - **10 Set of SAMPLE QUESTION PAPER**
  - **10 Set of PRACTICE QUESTION PAPER**
- Chapter wise detailed solutions of All the Previous
  - **Annual Examination/ Supplementary Examination/**
  - **Preparatory Examination/ Expected questions**

SPECIAL NOTE :

For Annual Examination, the most possible Questions are there in this **TOP SCORER POCKET MARKS PACKAGE** book. If you practice all the questions from this Booklet, you will get **100/100 marks** in Annual examination for sure. (Included theory and project/activity/assignment)

KABBUR PUBLICATIONS, SAVADATTI

If you want to score more, refer this book. Contact: 9738237960

BLUE PRINT PUC II YEARMATHEMATICS 2023-24

Time : 3hrs 15 min **Max Marks : 80**

Chapter	Contents	Part-A		Part-B	Part-C	Part-D	Part-E		Total Marks
		1 mark (MCQ)	1 mark (FB)	2 mark (SA)	3 mark (SA)	5 mark (LA)	6 mark (LA)	4 mark (LA)	
1	Relations and Functions	2			1	1			10
2	Inverse trigonometric functions	1	1	1	1				7
3	Matrices	1			1	1			9
4	Determinants	1	1	1		1		1	13
5	Continuity and Differentiability	2		1	2	1		1	19
6	Applications of Derivatives	1		2	1				8
7	Integrals	2		2	1	1	1		20
8	Application of Integrals					1			5
9	Differential Equations		1		1	1			9
10	Vectors	2		1	2				10
11	Three Dimensional Geometry	1	1	1		1			9
12	Linear programming	1					1		7
13	Probability	1	1	2	1				9
	Total Number of Questions	15	5	11	11	8	2	2	135
	To Answer the Questions	15	5	6	6	4	1	1	80

In this booklet,

QUESTION PAPERS	NOTATION	TOTAL
MODEL QUESTION PAPERS	MQP-01, MQP-02, MQP-03, MQP-04, MQP-05, MQP-06, MQP-07, MQP-08	**8**
ANNUAL EXAM QUESTION PAPERS	MARCH-2014, MARCH-2015, MARCH-2016, MARCH-2017, MARCH-2018, MARCH-2019 MARCH-2020, AUGUST-2021, MARCH-2022 MARCH-2023	**10**
SUPPLEMENTARY QUESTION PAPERS	JUNE-2014, JUNE-2015, JUNE-2016, JUNE-2017, JUNE-2018, JUNE-2019 JUNE-2020, SEPTEMBER-2022,JUNE-2023, AUGUST-2023	**10**
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,	**10**
LATEST MODEL QUESTION PAPERS	2019MQP-1, 2019MQP-2, 2019MQP-3 2021MQP-1, 2021MQP-2, 2022MQP-1, 2023MQP-2	**7**
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	**10**
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,	**10**
MOST LIKELY EXPECTED QUESTIONS WITH ANSWERS PREPARED BY EXPARTS		**25**
TOTAL QUESTION PAPERS WITH CHAPTERWISE SOLUTION		**100**

DESIGN OF QUESTION PAPER 2023-2024
PUC II YEAR MATHEMATICS (35)

Part of Question paper	Type of Questions	Number of Questions to be set	Number of Questions to be answered	Remark	Marks
Part-A	1 Mark Questions	20 (15MCQ+5FB)	20	Answer All the Questions	$20 \times 1 = 20$
Part-B	2 Marks Questions	11	6	Answer Any 6 out of 11 Question	$6 \times 2 = 12$
Part-C	3 Marks Questions	11	6	Answer Any 6 out of 11 Question	$6 \times 3 = 18$
Part-D	5 Marks Questions	8	4	Answer Any 4 out of 8 Question	$4 \times 5 = 20$
Part-E	6 Marks Questions	1 (a or b)	1	Answer Any 1 out of 2 Question (a or b)	$1 \times 6 = 6$
	4 Marks Questions	1 (a or b)	1	Answer Any 1 out of 2 Question (a or b)	$1 \times 4 = 4$
	Total Questions	52	38		Total Marks 80

BLUE PRINT PUC II YEARMATHEMATICS 2023-24

Based on **R**=Remember, **U**=Understand, **A**=Apply, **H**=Higher Order Thinking Skills

Time: 3hrs 15 min **Subject : Mathematics (35)** **Max Marks:80**

Chapter	Contents	Part-A		Part-B	Part-C	Part-D	Part-E		Total Marks
		1 mark (MCQ)	1 mark (FB)	2 mark (SA)	3 mark (SA)	5 mark (LA)	6 mark (LA)	4 mark (LA)	
1	Relations and Functions	1 (R) 1 (U)			1 (U)	1 (A)			10
2	Inverse trigonometric functions	1 (R)	1 (U)	1 (R)	1 (R)				7
3	Matrices	1 (R)			1 (R)	1 (U)			9
4	Determinants	1 (A)	1 (R)	1 (U)		1 (U)		1 (A)	13
5	Continuity and Differentiability	1 (A) 1 (H)		1 (U)	1 (R) 1 (A)	1 (R)		1 (A)	19
6	Applications of Derivatives	1 (H)		1 (R) 1 (U)	1 (H)				8
7	Integrals	1 (R) 1 (A)		1 (U) 1 (U)	1 (A)	1 (R)	1 (H)		20
8	Application of Integrals					1 (U)			5
9	Differential Equations		1 (R)		1 (A)	1 (U)			9
10	Vectors	1 (U) 1 (H)		1 (R)	1 (R) 1 (U)				10
11	Three Dimensional Geometry	1 (R)	1 (U)	1 (R)		1 (R)			9
12	Linear programming	1 (R)					1 (H)		7
13	Probability	1 (R)	1 (U)	1 (R) 1 (U)	1 (H)				9
	Total Number of Questions	15	5	11	11	8	2	2	135
	To Answer the Questions	15	5	6	6	4	1	1	80