SEAL

SET-X

10009

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU

ARE ASKED TO DO SO)

A

PG-EE-2022

SUBJECT: Mathematics Hons. (Five Year)

. A.		Sr. No
Time : 1¼ Hours	Max. Marks: 100	Total Questions: 100
Roll No. (in figures)	(in words)	
Name	Father's Name	
Mother's Name	Date of Examination_	
(Signature of the Candidate)	(4) 01 10 -	(Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

- 1. All questions are compulsory.
- 2. The candidates must return the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfairmeans / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
- 3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
- 4. Question Booklet along with answer key of all the A, B, C & D code will be got uploaded on the University website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet/Answer Key, the same may be brought to the notice of the Controller of Examinations in writing/through E.Mail (coe@mdurohtak.ac.in) within 24 hours of uploading the same on the University Website. Thereafter, no complaint in any case, will be considered.
- 5. The candidate *must not* do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers *must not* be ticked in the question booklet.
- There will be no negative marking. Each correct answer will be awarded one full mark.
 Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated
 as incorrect answer.
- 7. Use only Black or Blue Ball Point Pen of good quality in the OMR Answer-Sheet.
- 8. Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

1. If
$$\lambda$$
 is a non-real cube root of -2 , then the value of $\begin{vmatrix} 1 & 2\lambda & 1 \\ \lambda^2 & 1 & 3\lambda^2 \\ 2 & 2\lambda & 1 \end{vmatrix}$ is equal to:

(1) -10

(2) -13

(3) -11

(4) -12 (5.5) to 30 modified by William

2. If
$$z = \begin{vmatrix} 3+2i & 5-i & 7-3i \\ i & 2i & -3i \\ 3-2i & 5+i & 7+3i \end{vmatrix}$$
, where $i = \sqrt{-1}$, then z is:

(1) Purely Real

(2) Purely Imaginary

- (3) 1
- (4) 0

3. The value of the determinant
$$\begin{bmatrix} 1 & e^{i\pi/3} & e^{i\pi/4} \\ e^{-i\pi/3} & 1 & e^{2i\pi/3} \\ e^{-i\pi/4} & e^{-2i\pi/3} & 1 \end{bmatrix}$$
, where $i = \sqrt{-1}$ is:

(1) $2 + \sqrt{2}$

(3) $2 + \sqrt{3}$

(2) $2 - \sqrt{3}$ (4) $-(2 + \sqrt{2})$

4. If A is a skew-symmetric matrix, then trace of A is:

(1) -1

(2) 1

(3) 0

(4) i

5. If
$$A = \begin{bmatrix} \cos x & \sin x & 0 \\ -\sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix} = f(x)$$
, then A^{-1} is equal to :

(1) f(x)

(2) f(-x)

(3) -f(x)

(4) 0

- (1) A-I
- A la sidue ad (2) A + I de la considue lesse

(3) I

(4) 0

7. If x^y . $y^x = 16$, then $\frac{dy}{dx}$ at (2, 2) is:

(1) 0

(2)

(3) -1

 $\frac{1}{2} = \frac{1}{2} = \frac{1}{12} =$

8. If $x^2 + y^2 = t - \frac{1}{t}$ and $x^4 + y^4 = t^2 + \frac{1}{t^2}$, then $x^3 y \frac{dy}{dx}$ is equal to :

(1) 1

(2) -1

- (3) 0
- $\frac{1}{1-b} = 1 \text{ number}, \quad \frac{1}{2} = \frac{1}{2$

9. If $y = \tan^{-1} \left[\frac{\log_e(e/x^2)}{\log_e(ex^2)} \right] + \tan^{-1} \left[\frac{3 + 2\log_e x}{1 - 6\log_e x} \right]$, then $\frac{d^2y}{dx^2}$ is:

(1) -1

Lei Tilo and (2) alle primare supamer vestra il e ai till

(3) ∞

(4) 0

10. The locus of all points on the curve $y^2 = 4a \left[x + a \sin \left(\frac{x}{a} \right) \right]$ at which the tangent is parallel to x-axis is:

(1) Ellipse

(2) Hyperbola

(3) Parabola

(4) Circle

- 11. Let f(x) be a differential function for all x. If f(1) = -2 and $f'(x) \ge 2$ for all x in [1, 6], then minimum value of f(6) is equal to:
 - (1) 4

(2) 6

(3) 2

- (4) 8
- The minimum value of $\left(1 + \frac{1}{\sin^n \alpha}\right) \left(1 + \frac{1}{\cos^n \alpha}\right)$ is equal to :

(3) - 1

- (4) $\frac{1+2^{n/2}}{1-2^{n/2}}$
- **13.** If $\int f(x)\cos x \, dx = \frac{1}{2} \{f(x)\}^2 + c$, then f(x) is given by :
 - (1) $\sin x + c$

- (2) cos x + c
- (3) x + c (4) c
- **14.** $\int (x {}^{11}c_1x^2 + {}^{11}c_2x^3 {}^{11}c_3x^4 + \dots {}^{11}c_{11}x^{12}) dx \text{ is equal to :}$
 - (1) $\frac{(1-x)^{13}}{12} \frac{(1-x)^{12}}{12} + c$
- (2) $\frac{(1-x)^{12}}{12} + \frac{(1-x)^{13}}{13} + c$
- (3) $\frac{(1-x)^{13}}{12} + \frac{(1-x)^{12}}{13} + c$
- (4) None of these
- **15.** If $\int_{0}^{1} \frac{e^{t}}{t+1} dt = a$, then $\int_{0}^{b} \frac{e^{-t}}{t-b-1} dt$ is equal to :
 - (1) ae^{-b}
- (2) ae^b
- $(3) ae^{-b}$

- **16.** The value of $\int_{0}^{2} [x^2 x + 1] dx$ (where $[\cdot]$ denotes the greatest integer function) is given by:
 - (1) $\frac{7-\sqrt{5}}{2}$

(2) $\frac{8-\sqrt{5}}{2}$

- (3) $\frac{6-\sqrt{5}}{2}$
- tot lappe et $\left(\frac{1}{3}\right)$ (4) $\left(\frac{5-\sqrt{5}}{3}\right)$ to subsymmetric et 1
- The value of the integral $\int |\ln x| dx$ is:
 - (1) $1 \frac{1}{a}$

(2) $2\left(1-\frac{1}{2}\right)$

 $(3) \frac{1}{a} - 1$

- **18.** The area bounded by $y = \frac{\sin x}{x}$, x axis and the ordinates x = 0, $x = \frac{\pi}{4}$ is:
 - (1) $=\frac{\pi}{4}$ (2) $>\frac{\pi}{4}$
 - (3) $<\frac{\pi}{4}$ (4) 0
- The area between the curve $y = -x^2 + 2x^4$, the x-axis and the ordinates of two minima of the curve is:
 - (1) $\frac{7}{120}$ sq unit

(2) $\frac{9}{120}$ sq unit

- (3) $\frac{11}{120}$ sq unit
- (4) $\frac{13}{120}$ sq unit

- **20.** The value of f(0), so that the function $f(x) = \frac{1 \cos(1 \cos x)}{x^4}$ is continuous everywhere is:
 - $(1) \frac{1}{4}$

(2) $\frac{1}{8}$

- (4) None of these
- The value of 'a' for which $ax^2 + \sin^{-1}(x^2 2x + 2) + \cos^{-1}(x^2 2x + 2) = 0$ has a real solution, is:
 - $(1) \ \frac{2}{\pi}$
- and their $\frac{1}{\pi 021}$ (2) $-\frac{2}{\pi}$
- $(3) \ \frac{\pi}{2}$
- $\min(4) = \frac{1}{1000} (4) \frac{\pi}{2}$
- If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = 3\pi$, then xy + yz + zx is equal to:
 - (1) 0

(3) 3

- (4) -1
- The value of tan $\left\{ \cos^{-1}\left(-\frac{2}{7}\right) \frac{\pi}{2} \right\}$ is:

(3) $\frac{3}{\sqrt{5}}$

 $(4) \frac{4}{\sqrt{5}}$

- 24. The least value of 'a' for which $\frac{4}{\sin x} + \frac{1}{1 \sin x} = a$ has at least one solution in the interval $\left(0, \frac{\pi}{2}\right)$ is:
 - (1) 8

(2) 9

(3) 4

- amatrin anno (a) (4) 3
- 25. A spherical baloon is pumped at the rate of 10 inch³/min. If radius of baloon is 15 inch, then the rate of increase of its radius is:
 - (1) $\frac{1}{30\pi}$ inch/min
- (2) $\frac{1}{120\pi}$ inch/min
- (3) $\frac{1}{60\pi}$ inch/min
- (4) $\frac{1}{90\pi}$ inch/min
- **26.** The order of the differential equation whose general solution is given by :

 $y = (c_1 + c_2)\cos(x + c_3) - c_4$. $e^{x + c_5}$, where c_1 , c_2 , c_3 , c_4 and c_5 are arbitrary constant, is:

(1) 5

(2) 4

(3) 3

- (4) 2
- 27. The real value of n for which the substitution $y = u^n$ will transform the differential equation $2x^4y\frac{dy}{dx} + y^4 = 4x^6$ into a homogeneous equation is:
 - (1) $\frac{3}{2}$

(2) $\frac{5}{2}$

(3) $\frac{1}{2}$

(4) 1

- The differential equation representing the family of the curves $y^2 = 2c (x + \sqrt{c})$, where c is a positive parameter, is of:
 - (1) order 2, degree 2

(2) order 1, degree 3

(3) order 3, degree 1

- (4) None of these
- The solution of the differential equation $\sin y \frac{dy}{dx} = \cos y (1 x \cos y)$ is:
 - (1) $\sec y = x 1 ce^x$ (2) $\sec y = x + e^x + c$ (3) $\sec y = x 1 + ce^x$ (4) $\sec y = x + 1 + ce^x$

- 30. $\int \frac{3+2\cos x}{(2+3\cos x)^2} dx$ is equal to:
- (1) $\left(\frac{2\cos x}{2+3\sin x}\right)+c$ (2) $\left(\frac{2\cos x}{2+3\cos x}\right)+c$

- $(3) \left(\frac{\sin x}{2 + 3\cos x}\right) + c \qquad (4) \left(\frac{\sin x}{3 + 2\cos x}\right) + c$
- **31.** If $|\vec{a}| = 3$, $|\vec{b}| = 4$ and $|\vec{a} + \vec{b}| = 5$, then $|\vec{a} \vec{b}|$ is equal to :
 - (1) 5

(2) 4

(3) 2

- **32.** If $(\vec{a} \times \vec{b})^2 + (\vec{a} \cdot \vec{b})^2 = 144$ and $|\vec{a}| = 4$, then $|\vec{b}|$ is equal to:
 - (1) 4
- (2) 3

(3) 1

F- - - - (4) 2

33. Let $|\vec{a}| = 1$, $|\vec{b}| = 2$, $|\vec{c}| = 3$ and $\vec{a} \perp (\vec{b} + \vec{c})$, $\vec{b} \perp (\vec{c} + \vec{a})$, $\vec{c} \perp (\vec{a} + \vec{b})$. Then $|\vec{a} + \vec{b} + \vec{c}|$ is:

 $(1) \sqrt{10}$

 $(2) \sqrt{12}$

- $(3) \sqrt{8}$
- (4) $\sqrt{14}$

Let $\vec{a}, \vec{b}, \vec{c}$ be three vectors such that $\vec{a} \neq 0$ and $\vec{a} \times \vec{b} = 2 \vec{a} \times \vec{c}$, $|\vec{a}| = |\vec{c}| = 1$, $|\vec{b}| = 4$ and $|\vec{b} \times \vec{c}| = \sqrt{15}$. If $\vec{b} - 2\vec{c} = \lambda \vec{a}$, then λ is equal to:

- (3) -4 (4) 2

The point on the line $\frac{x-2}{1} = \frac{y+3}{-2} = \frac{z+5}{-2}$ at a distance of 6 from the point (2, -3, -5)

(1) (4, -7, -9)

(2) (4, 7, 9)

(3) (3, -5, -3)

(4) (-3, 5, 3)

The coordinates of the centroid of the triangle ABC, where A, B, C are the points of 36. intersection of the plane 6x + 3y - 2z = 18 with the coordinate axes are:

(1) (-1, 2, 3)

(3) (-1, -2, -3)

The points (8, -5, 6), (11, 1, 8), (9, 4, 2) and (6, -2, 0) are the vertices of a: 37.

(1) Rhombus

(2) Rectangle

(3) Parallelogram

(4) Square

The plane containing the two lines $\frac{x-3}{1} = \frac{y-2}{4} = \frac{z-1}{5}$ and $\frac{x-2}{1} = \frac{y+3}{-4} = \frac{z+1}{5}$ is 38. 11x + my + nz = 28, where:

(1) m = -1, n = 3

(2) m = -1, n = -3

(3) m = 1, n = 3

(4) m = 1, n = -3

(a) a = 2, B = 1

- **39.** If $z = (\lambda + 3) + i\sqrt{(5 \lambda^2)}$; then the locus of z is:
 - (1) a Straight line
- (2) a Parabola
- (3) a Circle
- (4) a Hyperbola
- **40.** If $8iz^3 + 12z^2 18z + 27i = 0$, (where $i = \sqrt{-1}$), then : 11 elements in the second of 12.
 - (1) $|z| = \frac{3}{2}$

(2) $|z| = \frac{2}{3}$

- (3) |z| = 1
- $(4) |z| = \frac{3}{4}$
- If n is a positive integer but not a multiple of 3 and $z = -1 + i\sqrt{3}$, (where $i = \sqrt{-1}$), then $(z^{2n} + 2^n, z^n + 2^{2n})$ is equal to :
 - (1) -1

(2) 1

- (3) 2"
- and to two bearrol ad one took (4) 0 next real endmun to reduce add
- The value of α for which the equation $(\alpha + 5) x^2 (2\alpha + 1)x + (\alpha 1) = 0$ has roots equal in magnitude but opposite in sign, is:

 $(3) \frac{7}{4}$

- (4) 1
- **43.** Let α , β be the roots of the equation (x-a)(x-b)=c, $c\neq 0$. Then the roots of the equation $(x - \alpha)(x - \beta) + c = 0$ are:
 - (1) a, c

(2) b, c

(3) a, b

(4) a + c, b + c

E 10 (2) ... a

- **44.** If α , β are the roots of the equation $x^2 + x\sqrt{\alpha} + \beta = 0$, then the values of α and β are :

 - (1) $\alpha = 1, \beta = -2$ (2) $\alpha = 1, \beta = -1$ definition (2) $\alpha = 1$

 - (3) $\alpha = 2, \beta = 1$ (4) $\alpha = 2, \beta = -2$
- The number of diagonals that can be drawn in an octagon is:

(3) 28

- (4) 20
- If n is an integer between 0 and 21, then the minimum value of $\lfloor n \cdot \lfloor 21 n \rfloor$ is: 46.

 - (1) 20 m Chi = 1 v = 1 m E lo skg (2) 10 11 m seem aviding a 2 m M . P then (a to a to a sented to ..
 - (3) | 21

- 47. The number of numbers less than 1000 that can be formed out of the digits 0, 1, 2, 4 and 5, no digit being repeated is: The value of or for which the equation (a + 5) r

(2) 130 and an and a further arm mid league

(3) 68

- (4) None of these
- The number of six digit numbers that can be formed from the digits 1, 2, 3, 4, 5, 6 and 7, so that digits don't repeat and the terminal digits are even is:
 - (1) 720

(2)72

(3) 288

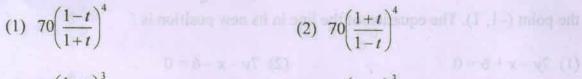
- (4) 144
- The total number of terms in the expansion of $(x+a)^{100} + (x-a)^{100}$ after simplification
 - (1) 50

(3) 150

(4) 102

50.	For a positive integ	ger n , if the expansion of $(2x^{-1} + x^2)^n$ has the for n is:	a term independent of x ,
	(1) 22	(2) 16	(A (A)
	(3) 10	(4) 18	

The term independent of x in the expansion of $[(t^{-1}-1)x+(t^{-1}+1)^{-1}x^{-1}]^8$ is:



(3)
$$56\left(\frac{1+t}{1-t}\right)^3$$
 (4) $56\left(\frac{1-t}{1+t}\right)^3$

In the expansion of $(1+x)^{43}$, the coefficients of the (2r+1)th and (r+2)th terms are equal, then the value of r is:

- (3) 14 (4) 13 (1) 16(2) 15
- An infinite G. P. has first term x and sum 5, then x belongs to:

$$(1) x < -10$$
 (2) $0 < x < 10$

$$(3) -10 < x < 0$$
 (4) $x > 0$

54. In the quadratic equation $ax^2 + bx + c = 0$, if $\Delta = b^2 - 4ac$ and $\alpha + \beta$, $\alpha^2 + \beta^2$, $\alpha^3 + \beta^3$ are in G.P., where α , β are the roots of $ax^2 + bx + c = 0$, then:

- (1) $\Delta \neq 0$ (2) $b\Delta = 0$
- (3) $\Delta = 0$

55. If the sum of first n positive integers is $\frac{1}{5}$ times the sum of their squares, then n equals:

(2) 8 (3) 5 (4) 6

56. If $\frac{a+bx}{a-bx} = \frac{b+cx}{b-cx} = \frac{c+dx}{c-dx}$ ($x \ne 0$), then a, b, c, d are in:

(1) AP

(2) GP

(3) HP

(4) None of these

The line 3x - 4y + 7 = 0 is rotated through an angle $\frac{\pi}{4}$ in the clockwise direction about the point (-1, 1). The equation of the line in its new position is :

(1) 7y - x + 6 = 0

- (3) 7y + x 6 = 0
- (2) 7y x 6 = 0(4) 7y + x + 6 = 0

The diagonals of the parallelogram whose sides are lx + my + n = 0, lx + my + n' = 0, mx + ly + n = 0, mx + ly + n' = 0 include an angle:

 $\pm 1 (8) (2) \frac{\pi}{3}$

An infinite G. P. has first term a mid man 5, then a belong

If an equilateral triangle has one side given by x + y - 2 = 0 and its centroid is at the origin, then one vertex of the triangle is:

- (1) (-2, -2)
- (2) (-2, 2) has been said -9.0 m as
- (3) (2, -2)

(4)(-1,-1)

60. If each of the points $(x_1, 4)$, $(-2, y_1)$ lies on the line joining the points (2, -1), (5, -3), then the point $P(x_1, y_1)$ lies on the line: If the sum of first a positive integers is -

- times the sum of their squares, then a (1) 2x + 6y + 1 = 0
- (2) 2x + 3y 6 = 0

- (3) 6(x+y)-23=0
- (4) 6(x+y) 25 = 0

- Radius of the largest circle which passes through the focus of the parabola $y^2 = 4x$ and contained in it, is:
 - (1) 2

- (3) 8
- (2) 4
- The distances from the foci of P(a, b) on the ellipse $\frac{x^2}{9} + \frac{y^2}{25} = 1$ are:
 - (1) $4 \pm \frac{5}{4}b$

(2) $5 \pm \frac{4}{5}a$

- (3) $5 \pm \frac{4}{5}b$
- (4) None of these
- Two conics $\frac{x^2}{a^2} \frac{y^2}{b^2} = 1$ and $x^2 = -\frac{a}{b}y$ intersect, if:
 - (1) $a^2 < \frac{1}{4}$
- (2) $a^2 > \frac{1}{4}$ (4) None of these
- (3) $a^2 = \frac{1}{4}$

- The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$, and having its centre (0, 3) is:
 - (1) 3

(2) $\sqrt{3}$

(3) 2

- hm 1 (4) 4
- The locus of the point, the sum of squares of whose distance, from the planes x z = 0, x-2y+z=0 and x+y+z=0 is 36 is given by:
 - (1) $x^2 + y^2 + z^2 = 6$
- (2) $x^{-2} + y^{-2} + z^{-2} = \frac{1}{36}$
- (3) $x^2 + y^2 + z^2 = 36$
- (4) $x^2 + y^2 + z^2 = 216$

- 66. The equation of the plane through the point (2, 5, -3) perpendicular to the planes x + 2y + 2z = 1 and x 2y + 3z = 4 is:
 - (1) 3x 4y + 2z = 20
- (2) 10x y 4z = 27
- (3) 3x + 4y 2z = 20

- (4) 10x + y + 4z = 27
- 67. A line makes angles α , β , γ , δ with the four diagonals of a cube. Then $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma + \cos^2 \delta$ is :
 - (1) $\frac{4}{3}$

(2) $\frac{1}{3}$

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

- (4) $\frac{3}{4}$
- **68.** The symmetric form of the equations of the line x + y z = 1, 2x 3y + z = 2 is:
 - (1) $\frac{x}{2} = \frac{y}{3} = \frac{z}{5}$

(2) $\frac{x}{2} = \frac{y}{3} = \frac{z-1}{5}$

- (3) $\frac{x}{3} = \frac{y}{2} = \frac{z}{5}$
- $(4) \ \frac{x-1}{2} = \frac{y}{3} = \frac{z}{5}$
- **69.** If $A = \cos(\cos x) + \sin(\cos x)$, the least and greatest value of A are:
 - (1) 0 and 2

- (2) -1 and 1
- (3) $-\sqrt{2}$ and $\sqrt{2}$

- (4) $\frac{1}{\sqrt{2}}$ and $\sqrt{2}$
- 70. The least value of $\csc^2 x + 25 \sec^2 x$ is:
 - (1) 38
- (2) 36
- (3) 34
- (4) 32

- 71. If $\sin \theta_1 + \sin \theta_2 + \sin \theta_3 = 3$, then $\cos \theta_1 + \cos \theta_2 + \cos \theta_3$ is equal to:
 - (1) 0

(3) 2

- E >4 (a) (4) 3
- 72. If $\tan x \tan y = a$ and $x + y = \frac{\pi}{6}$, then $\tan x$ and $\tan y$ satisfy the equation:
 - (1) $x^2 \sqrt{3} (1-a)x + a = 0$ (2) $x^2 + \sqrt{3} (1-a)x + a = 0$

 - (3) $\sqrt{3}x^2 + (1+a)x a\sqrt{3} = 0$ (4) $\sqrt{3}x^2 (1-a)x + a\sqrt{3} = 0$
- 73. Fifteen coupons are numbered 1, 2, 3,, 15 respectively. Seven coupons are selected at random one at a time with replacement. The probability that the largest number appearing on a selected coupon is atmost 9, is:
 - (1) $\left(\frac{1}{15}\right)'$

 $(2) \left(\frac{8}{15}\right)^7$

(3) $\left(\frac{3}{5}\right)^t$

- $(4) \left(\frac{4}{5}\right)^7$
- The probability of guessing correctly at least 8 out of 10 answers on a true-false examination, is:
 - $(1) \frac{7}{128}$

(2) $\frac{7}{64}$ and 36 dill no band so (2)

 $(3) \frac{45}{1024}$

- (4) $\frac{175}{1024}$
- A fair die is thrown untill a score of less than five points is obtained. The probability of obtaining less than three points on the last throw is:

 $(3) \frac{4}{5}$

 $(4) \frac{5}{6}$

- 76. Two players A and B throw a die alternately for a prize of Rs. 11, which is to be won by a player who first throws a six. If A starts the game, their respective expectations are: (2) Rs. 8; Rs. 3 (1) Rs. 7; Rs. 4 (4) Rs. 6; Rs. 5 (3) Rs. 6; Rs. 5 rentance and user, said the opposition 77. The mean of 8 observations is 9 and their variance is 9.25. If six of the observations are
- 6, 7, 10, 12, 12 and 13, then the remaining two observations are: (1) 8, 6

(3) 8, 4

- (4) 8, 3
- clear as maintainment at a time, with replacement. The modelities 78. The frequencies of values 0, 1, 2,, n of a variable are q^n , $c_1 q^{n-1} p^1$, $c_2 q^{n-2}$ p^{2} ,, p^{n} , where p + q = 1. The mean is:
 - (1) n + p

(2) np

 $(3) \frac{n}{p}$

- (4) n-p
- Which of the following is not a merit of Mean Deviation?
 - (1) It is unduly affected by the presence of extreme items
 - (2) It is based on all the items
 - (3) It can be calculated by using any average
 - (4) None of these
- The variance of 20 observations is 5. If each observation is multiplied by 2, find the 80. new variance of the resulting observations.
 - (1) 100

(2) 50

(3) 40

(4) 20

81. The range of the function $f(x) = 3|\sin x| - 2|\cos x|$ is:

(1) $[-2, \sqrt{13}]$

(3) [-3, 2]

 $(4) [3, \sqrt{13}]$

82. Let $f: R \to \left[0, \frac{\pi}{2}\right]$ be a function defined by $f(x) = \tan^{-1}(x^2 + x + a)$. If f is onto, then a equals:

- 1) $\frac{1}{4}$ (2) $\frac{1}{2}$ or selected the same pillosotron
- (3) 1

(4) 0

If the domain of f(x) is (0, 1), then the domain of $f(e^x) + f(\ln |x|)$ is:

(1) (-1, e)

- (2) (-e, -1)
- (3) (-e, 1) (4) (1, e) (4) (1, e)

84. Let $f: R \to R$ be a function defined by $f(x) = \frac{x^2 + 2x + 5}{x^2 + x + 1}$. The function f(x) is:

- (1) one-one and into
- (2) one-one and onto
- (3) many one and onto

(4) many one and into

The probability that at least one of the events A and B occurs is $\frac{3}{5}$. If A and B occur simultaneously with probability $\frac{1}{5}$, then $P(\overline{A}) + P(\overline{B})$ is:

(2) $\frac{4}{5}$ to shedue asgons to school and

(3) $\frac{6}{5}$

 $\frac{7}{5}$ (4) $\frac{7}{5}$

- A bag contains 16 coins of which two are counterfeit with heads on both sides. The rest are fair coins. One is selected at random from the bag and tossed. The probability of getting a head is:
 - (1) $\frac{9}{16}$ (2) $\frac{11}{16}$

- (3) $\frac{13}{16}$
- An urn contains five balls. Two balls are drawn and are found to be white. The 87. probability that all the balls are white is:

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

- $y' = \frac{1}{3}$ and $y' = y' = \frac{1}{3}$ and $y' = y' = \frac{1}{3}$ and $y' = \frac{1}{3}$ and $y' = \frac{1}{3}$ and $y' = \frac{1}{3}$
- A box contains 6 nails and 10 nuts. Half of the nails and half of the nuts are rusted. If 88. one item is chosen at random, the probability that it is rusted or is a nails is :
 - (1) $\frac{3}{16}$ normal of $\frac{2+42+4}{4824}$ (2) $\frac{5}{16}$ 1 is a family and 3+3+3+3+3+4
 - (3) $\frac{9}{16}$ (4) $\frac{11}{16}$
- The maximum value of P = 6x + 8y subject to constraints $2x + y \le 30$, $x + 2y \le 24$, $x \ge 0, y \ge 0$ is:
 - (1) 90

- ri (Eyt active (2) 96
- (3) 120

- (4) 240
- The number of proper subsets of the set $\{1, 2, 3\}$ is:
 - (1) 6

(3) 8

(2) 7

91.	In a city 20 per cent of the population travels by car, 50 per cent travels by bus and 10 per cent travels by both car and bus. Then persons travelling by car or bus is:	
	(1) 40 per cent	(2) 60 per cent
	(3) 70 per cent	(4) 80 per cent
92.	Let $n(U) = 700$, $n(A) = 200$, $n(B) = 300$	and $n(A \cap B) = 100$, then $n(A^C \cap B^C)$ is:
	(1) 600	(2) 400 saiyee qhu noilegen ear 20
	(3) 200	(4) 300
93.	If A and B are two sets, then $A \cup B = A$	
	(1) A ⊆ B	(2) B⊆A
	(3) $A = B$	(4) None of these
94.		$a^2 - 4ab + 3b^2 = 0$, $(a, b \in N)$ is:
	(1) Reflexive	(2) Symmetric
	(3) Transitive	(4) None of these
95.	If $0 \le a \le b$, then $\lim_{n \to \infty} (b^n + a^n)^{1/n}$ is equal	al to :
	(1) e	(2) b
	(3) a	(4) None of these
96.	The set of all points, where $f(x) = 3\sqrt{x^2}$	x - x - 1 is not differentiable is:
	(1) {0}	(2) {-1, 0, 1}
	(3) {0, 1}	(4) None of these
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(E) (E) .

- The points of discontinuity of the function $f(x) = \lim_{n \to \infty} \frac{(2\sin x)^{2n}}{3^n (2\cos x)^{2n}}$ are given by:
 - $(1) r\pi + \frac{\pi}{12}, r \in I$

- $(2) r\pi + \frac{\pi}{3}, r \in I$
- (3) $r \pi \pm \frac{\pi}{6}, r \in I$ (4) None of these
- The negation of $p \rightarrow q$ is: 98.
 - (1) $p \wedge \sim q$

 $(2) q \to p$

(3) $q' \rightarrow p$

- (4) $p \rightarrow q'$
- The disjunction $p \vee q$ is false only when:
 - (1) p is false

- (2) q is false
- (3) p and q are both false
- (4) None of these
- If $A = \{1, 3, 5, 7\}$, $B = \{2, 5\}$, then the number of relations from A to B is:
 - (1) 256

(2) 128

(3) 64

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

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| SET-X

SUBJECT: Mathematics Hons. (Five Year)

		Sr. No. 10006	
Time : 1¼ Hours Roll No. (in figures)	Max. Marks : 100 (in words)	Total Questions : 100	
Name	Father's Name		
Mother's Name	Date of Examination_	and the same of the same	
(Signature of the Candidate)	edicil thepot last test is last _	(Signature of the Invigilator)	

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

- 1. All questions are compulsory.
- 2. The candidates must return the question booklet as well as OMR Answer-Sheet to the Invigilate concerned before leaving the Examination Hall, failing which a case of use of unfairmeans / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
- 3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
- 4. Question Booklet along with answer key of all the A, B, C & D code will be got uploaded on the University website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet/Answer Key, the same may be brought to the notice of the Controller of Examinations in writing/through E.Mail (coe@mdurohtak.ac.in) within 24 hours of uploading the same on the University Website. Thereafter, no complaint in any case, will be considered.
- 5. The candidate must not do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers must not be ticked in the question booklet.
- There will be no negative marking. Each correct answer will be awarded one full mark.
 Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated
 as incorrect answer.
- 7. Use only Black or Blue Ball Point Pen of good quality in the OMR Answer-Sheet.
- 8. Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

- 1. If $\sin \theta_1 + \sin \theta_2 + \sin \theta_3 = 3$, then $\cos \theta_1 + \cos \theta_2 + \cos \theta_3$ is equal to:
 - (1) 0

(2) 1

(3) 2

- (4) 3
- If $\tan x \tan y = a$ and $x + y = \frac{\pi}{6}$, then $\tan x$ and $\tan y$ satisfy the equation:
 - (1) $x^2 \sqrt{3} (1-a)x + a = 0$ (2) $x^2 + \sqrt{3} (1-a)x + a = 0$
- (3) $\sqrt{3}x^2 + (1+a)x a\sqrt{3} = 0$ (4) $\sqrt{3}x^2 (1-a)x + a\sqrt{3} = 0$
- 3. Fifteen coupons are numbered 1, 2, 3,, 15 respectively. Seven coupons are selected at random one at a time with replacement. The probability that the largest number appearing on a selected coupon is atmost 9, is:
 - (1) $\left(\frac{1}{15}\right)^r$

 $(2) \left(\frac{8}{15}\right)^7$

(3) $\left(\frac{3}{5}\right)^{7}$

- $(4) \left(\frac{4}{5}\right)^7$
- The probability of guessing correctly at least 8 out of 10 answers on a true-false examination, is:
 - (1) $\frac{7}{128}$

 $(2) \frac{7}{64}$

- (4) $\frac{175}{1024}$
- A fair die is thrown untill a score of less than five points is obtained. The probability of obtaining less than three points on the last throw is:

6.	Two players A and B throw a die alternately for a prize of Rs. 11, which is to be won
	by a player who first throws a six. If A starts the game, their respective expectations
	are:

(1) Rs. 7; Rs. 4

(2) Rs. 8; Rs. 3

(3) Rs. 6; Rs. 5

(4) Rs. 6; Rs. 5

7. The mean of 8 observations is 9 and their variance is 9.25. If six of the observations are 6, 7, 10, 12, 12 and 13, then the remaining two observations are:

- (1) 8, 6 Elementary (1) (2) 8, 5 Elementary (1) 4 Elementary (1)
- (3) 8, 4 (4) 8, 3

8. The frequencies of values 0, 1, 2,, n of a variable are q^n , $c_1 q^{n-1} p^1$, p^{2} ,, p^{n} , where p + q = 1. The mean is :

(1) n + p

(2) np

(3) $\frac{n}{n}$

(4) n-p

9. Which of the following is *not* a merit of Mean Deviation?

- (1) It is unduly affected by the presence of extreme items
- (2) It is based on all the items
- (3) It can be calculated by using any average
- (4) None of these

A Late Circ in thrown until a score of less than five points is obtained. The probability 10. The variance of 20 observations is 5. If each observation is multiplied by 2, find the new variance of the resulting observations.

(1) 100

(2) 50

(3) 40

- 11. The term independent of x in the expansion of $[(t^{-1}-1)x+(t^{-1}+1)^{-1}x^{-1}]^8$ is:

- (1) $70\left(\frac{1-t}{1+t}\right)^4$ (2) $70\left(\frac{1+t}{1-t}\right)^4$ (3) $56\left(\frac{1+t}{1-t}\right)^3$ (4) $56\left(\frac{1-t}{1+t}\right)^3$
- 12. In the expansion of $(1+x)^{43}$, the coefficients of the (2r+1)th and (r+2)th terms are equal, then the value of r is:
 - (1) 16
- (2) 15
- (3) 14
- **13.** An infinite G. P. has first term x and sum 5, then x belongs to:
 - (1) x < -10

(2) 0 < x < 10

- (3) -10 < x < 0
- (4) x > 0
- 14. In the quadratic equation $ax^2 + bx + c = 0$, if $\Delta = b^2 4ac$ and $\alpha + \beta$, $\alpha^2 + \beta^2$, $\alpha^3 + \beta^3$ are in G.P., where α , β are the roots of $ax^2 + bx + c = 0$, then:
 - (1) $\Delta \neq 0$

 $(2) b\Delta = 0$

- (3) $\Delta = 0$ (4) $c\Delta = 0$
- 15. If the sum of first n positive integers is $\frac{1}{5}$ times the sum of their squares, then n equals:
 - (1) 7
- (2) 8 (3) 5
- (4) 6
- **16.** If $\frac{a+bx}{a-bx} = \frac{b+cx}{b-cx} = \frac{c+dx}{c-dx}$ ($x \ne 0$), then a, b, c, d are in:
 - (1) AP

(2) GP

(3) HP

(4) None of these

(1)
$$7y - x + 6 = 0$$

(2)
$$7y - x - 6 = 0$$

(3)
$$7v + x - 6 = 0$$

(2)
$$7y-x-6=0$$

(4) $7y+x+6=0$

The diagonals of the parallelogram whose sides are lx + my + n = 0, lx + my + n' = 0, mx + ly + n = 0, mx + ly + n' = 0 include an angle:

$$(1) \frac{\pi}{6}$$

$$\frac{\pi}{3}$$
 (2) $\frac{\pi}{3}$

$$(3) \ \frac{\pi}{4}$$

are concluding and
$$\frac{\pi}{2}$$
 and $\frac{\pi}{2}$ are the set of Dancille and $\frac{\pi}{2}$ of $\frac{\pi}{2}$

19. If an equilateral triangle has one side given by x + y - 2 = 0 and its centroid is at the origin, then one vertex of the triangle is:

$$(1)$$
 $(-2, -2)$

$$(3)$$
 $(2, -2)$

$$0 = AA (5) (4) (-1, -1)$$

If each of the points $(x_1, 4)$, $(-2, y_1)$ lies on the line joining the points (2, -1), (5, -3), then the point $P(x_1, y_1)$ lies on the line:

(1)
$$2x + 6y + 1 = 0$$

(2)
$$2x + 3y - 6 = 0$$

(3)
$$6(x+y)-23=0$$

$$(4) 6(x+y) - 25 = 0$$

The range of the function $f(x) = 3|\sin x| - 2|\cos x|$ is: 21.

(1)
$$[-2, \sqrt{13}]$$

- **22.** Let $f: R \to \left[0, \frac{\pi}{2}\right]$ be a function defined by $f(x) = \tan^{-1}(x^2 + x + a)$. If f is onto, then a equals:
 - (1) $\frac{1}{4}$

(3) 1

- If the domain of f(x) is (0, 1), then the domain of $f(e^x) + f(\ln |x|)$ is: 23.
 - (1) (-1, e)

(3) (-e, 1)

- (4) (1, e)
- Let $f: R \to R$ be a function defined by $f(x) = \frac{x^2 + 2x + 5}{x^2 + x + 1}$. The function f(x) is:
 - (1) one-one and into

- (2) one-one and onto
- (3) many one and onto

- (4) many one and into
- The probability that at least one of the events A and B occurs is $\frac{3}{5}$. If A and B occur simultaneously with probability $\frac{1}{5}$, then $P(\overline{A}) + P(\overline{B})$ is:
- (2) $\frac{4}{5}$
- (3) $\frac{6}{5}$

- $(4) \frac{7}{5}$
- A bag contains 16 coins of which two are counterfeit with heads on both sides. The rest are fair coins. One is selected at random from the bag and tossed. The probability of getting a head is:
 - $(1) \frac{9}{16}$
- (2) $\frac{11}{16}$ (3) $\frac{13}{16}$
- $(4) \frac{15}{16}$

- An urn contains five balls. Two balls are drawn and are found to be white. The probability that all the balls are white is:

- $(2) \frac{1}{2} \\ (4) \frac{1}{3}$
- A box contains 6 nails and 10 nuts. Half of the nails and half of the nuts are rusted. If 28. one item is chosen at random, the probability that it is rusted or is a nails is :
 - (1) $\frac{3}{16}$

(a,1) (b) (2) $\frac{5}{16}$

- Let $f: R \to R$ be a flavorion defined by $f(x) = \frac{x^2 + 2x + 5}{16}$. The function
- The maximum value of P = 6x + 8y subject to constraints $2x + y \le 30$, $x + 2y \le 24$, $x \ge 0, y \ge 0$ is:
 - (1) 90
- (2)96The probability that at least-gate of the events A and B occurs to
- (3) 120
- (4) 240 timultaneously with probability ... then P(x) = P(R) in t
- The number of proper subsets of the set $\{1, 2, 3\}$ is: 30.
 - (1) 6

(3) 8

- (4) 9
- **31.** Let f(x) be a differential function for all x. If f(1) = -2 and $f'(x) \ge 2$ for all x in [1, 6], then minimum value of f(6) is equal to: then minimum value of f(6) is equal to:
 - (1) 4

(3) 2

- 32. The minimum value of $\left(1 + \frac{1}{\sin^n \alpha}\right) \left(1 + \frac{1}{\cos^n \alpha}\right)$ is equal to:
 - (1) 1

(2) $(1+2^{n/2})^2$

- $(4) \frac{1+2^{n/2}}{1-2^{n/2}}$
- 33. If $\int f(x)\cos x \, dx = \frac{1}{2} \{f(x)\}^2 + c$, then f(x) is given by:
 - (1) $\sin x + c$

(2) $\cos x + c$

- **34.** $\int (x^{-11}c_1x^2 + {}^{11}c_2x^3 {}^{11}c_3x^4 + \dots {}^{11}c_{11}x^{12}) dx$ is equal to:
- (1) $\frac{(1-x)^{13}}{13} \frac{(1-x)^{12}}{12} + c$ (2) $\frac{(1-x)^{12}}{12} + \frac{(1-x)^{13}}{13} + c$

 - (3) $\frac{(1-x)^{13}}{12} + \frac{(1-x)^{12}}{13} + c$ (4) None of these
- **35.** If $\int_{0}^{1} \frac{e^{t}}{t+1} dt = a$, then $\int_{b-1}^{b} \frac{e^{-t}}{t-b-1} dt$ is equal to :

- (1) ae^{-b} (2) ae^{b} (3) $-ae^{-b}$ (4) $-be^{-a}$
- The value of $\int [x^2 x + 1]dx$ (where [·] denotes the greatest integer function) is given

 - (1) $\frac{7-\sqrt{5}}{2}$ (2) $\frac{8-\sqrt{5}}{2}$ (3) $\frac{6-\sqrt{5}}{2}$ (4) $\frac{5-\sqrt{5}}{2}$

(1)
$$1 - \frac{1}{e}$$

(2)
$$2\left(1-\frac{1}{e}\right)$$

(3)
$$\frac{1}{e} - 1$$

$$(4) (e-1)^{-1}$$

The area bounded by $y = \frac{\sin x}{x}$, x - axis and the ordinates x = 0, $x = \frac{\pi}{4}$ is:

$$(1) = \frac{\pi}{4}$$

$$(2) > \frac{\pi}{4}$$

$$(3) < \frac{\pi}{4}$$

The area between the curve $y = -x^2 + 2x^4$, the x-axis and the ordinates of two minima of the curve is: of the curve is:

(1)
$$\frac{7}{120}$$
 sq unit (2) $\frac{9}{120}$ sq unit

(2)
$$\frac{9}{120}$$
 sq unit

(3)
$$\frac{11}{120}$$
 sq unit

(4)
$$\frac{13}{120}$$
 sq unit

The value of f(0), so that the function $f(x) = \frac{1 - \cos(1 - \cos x)}{x^4}$ is continuous everywhere is: $\frac{1}{8}$

(1)
$$\frac{1}{4}$$

(2)
$$\frac{1}{8}$$

(3)
$$\frac{1}{2}$$

(3)
$$\frac{1}{2}$$
 (4) None of these

41.	In a city 20 per cent of the population travels by car, 50 per cent travels by bus and 10 per cent travels by both car and bus. Then persons travelling by car or bus is:	
	(1) 40 per cent	(2) 60 per cent
	(3) 70 per cent	(4) 80 per cent
42.	Let $n(U) = 700$, $n(A) = 200$, $n(B) = 300$ and $n(A \cap B) = 100$, then $n(A^C \cap B^C)$ is:	
	(1) 600	(2) 400
	(3) 200	(4) 300
43.	If A and B are two sets, then $A \cup B = A$	$\cap B$ iff:
	(1) A⊆B	(2) B⊆A selift dod om g ban q (£)
dil.	(3) $A = B$	(4) None of these
44.		$a^2 - 4ab + 3b^2 = 0$, $(a, b \in N)$ is:
		(2) Symmetric
ben	(3) Transitive and the many and the many	(4) None of these
45.	If $0 < a < b$, then $\lim_{n \to \infty} (b^n + a^n)^{1/n}$ is equal	
	(1) e	(2) b
	(3) $a = \frac{2}{200} = \frac{4}{20} = \frac{4}{20} = \frac{1}{20}$ explicated	(4) None of these
46.	The set of all points, where $f(x) = 3\sqrt{x^2}$	x - x - 1 is not differentiable is :
	(1) {0}	(2) {-1, 0, 1}
	(3) {0, 1}	(4) None of these
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- The points of discontinuity of the function $f(x) = \lim_{n \to \infty} \frac{(2\sin x)^{2n}}{3^n (2\cos x)^{2n}}$ are given by :
 - (1) $r \pi + \frac{\pi}{12}, r \in I$ (2) $r \pi + \frac{\pi}{3}, r \in I$

- (3) $r \pi \pm \frac{\pi}{4}, r \in I$
- (4) None of these
- The negation of $p \to q$ is : 48.
 - (1) $p \wedge \sim q$

- (3) $q' \rightarrow p$
- $(2) q \rightarrow p$ $(4) p \rightarrow q'$
- The disjunction $p \vee q$ is false only when:
 - (1) p is false

- (2) q is false
- (3) p and q are both false
- (4) None of these
- If $A = \{1, 3, 5, 7\}$, $B = \{2, 5\}$, then the number of relations from A to B is:
 - (1) 256 and 4 and 5 and 5 and 5 (2) 128 of Lamber V and 8 and 1012 F and 1

(3)64

- (4) 32
- Radius of the largest circle which passes through the focus of the parabola $y^2 = 4x$ and contained in it, is:
 - (1) 2

(2) 4 What Amil and Amil and Amil 10

- (4) 5
- The distances from the foci of P(a, b) on the ellipse $\frac{x^2}{9} + \frac{y^2}{25} = 1$ are:
 - (1) $4 \pm \frac{5}{4}b$ (2) $5 \pm \frac{4}{5}a$

- (3) $5 \pm \frac{4}{5}b$
- (4) None of these

- **53.** Two conics $\frac{x^2}{a^2} \frac{y^2}{b^2} = 1$ and $x^2 = -\frac{a}{b}y$ intersect, if:
 - (1) $a^2 < \frac{1}{4}$

(2) $a^2 > \frac{1}{4}$

- The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$, and having its centre (0, 3) is:
 - (1) 3

(2) $\sqrt{3}$

(3) 2

- The locus of the point, the sum of squares of whose distance, from the planes x z = 0, x - 2y + z = 0 and x + y + z = 0 is 36 is given by :
 - $(1) x^2 + y^2 + z^2 = 6$
- (2) $x^{-2} + y^{-2} + z^{-2} = \frac{1}{36}$
- (3) $x^2 + y^2 + z^2 = 36$
- (4) $x^2 + y^2 + z^2 = 216$
- The equation of the plane through the point (2, 5, -3) perpendicular to the planes x + 2y + 2z = 1 and x - 2y + 3z = 4 is:
 - (1) 3x 4y + 2z = 20
- (2) 10x y 4z = 27
- (3) 3x + 4y 2z = 20
- (4) 10x + y + 4z = 27
- 57. A line makes angles α , β , γ , δ with the four diagonals of a cube. Then $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma + \cos^2 \delta$ is:

- The symmetric form of the equations of the line x + y z = 1, 2x 3y + z = 2 is:
 - (1) $\frac{x}{2} = \frac{y}{3} = \frac{z}{5}$
- (2) $\frac{x}{2} = \frac{y}{3} = \frac{z-1}{5}$ (4) $\frac{x-1}{2} = \frac{y}{3} = \frac{z}{5}$
- (3) $\frac{x}{3} = \frac{y}{2} = \frac{z}{5}$

- If $A = \cos(\cos x) + \sin(\cos x)$, the least and greatest value of A are:
 - (1) 0 and 2
- 2) -1 and 1
- (3) $-\sqrt{2}$ and $\sqrt{2}$

- (4) $\frac{1}{\sqrt{2}}$ and $\sqrt{2}$
- **60.** The least value of $\csc^2 x + 25 \sec^2 x$ is:
 - (1) 38

(3) 34

- (4) 32
- **61.** If $|\vec{a}| = 3$, $|\vec{b}| = 4$ and $|\vec{a} + \vec{b}| = 5$, then $|\vec{a} \vec{b}|$ is equal to:
 - (1) 5
- 015 (2) 4
- (3) 2
- he equation of the plane through the point (2, 5, -3) perpendicular to
- **62.** If $(\vec{a} \times \vec{b})^2 + (\vec{a} \cdot \vec{b})^2 = 144$ and $|\vec{a}| = 4$, then $|\vec{b}|$ is equal to:
 - (1) 4
- (2) 3
- (3) 1
- (4) 2
- **63.** Let $|\vec{a}| = 1$, $|\vec{b}| = 2$, $|\vec{c}| = 3$ and $\vec{a} \perp (\vec{b} + \vec{c})$, $\vec{b} \perp (\vec{c} + \vec{a})$, $\vec{c} \perp (\vec{a} + \vec{b})$. Then $|\vec{a} + \vec{b} + \vec{c}|$ is:
 - (1) $\sqrt{10}$

(2) $\sqrt{12}$

 $(3) \sqrt{8}$

- **64.** Let \vec{a} , \vec{b} , \vec{c} be three vectors such that $\vec{a} \neq 0$ and $\vec{a} \times \vec{b} = 2\vec{a} \times \vec{c}$, $|\vec{a}| = |\vec{c}| = 1$, $|\vec{b}| = 4$ and $|\vec{b} \times \vec{c}| = \sqrt{15}$. If $\vec{b} - 2\vec{c} = \lambda \vec{a}$, then λ is equal to :
 - (1) 1
- (2) 3

- The point on the line $\frac{x-2}{1} = \frac{y+3}{-2} = \frac{z+5}{-2}$ at a distance of 6 from the point (2, -3, -5)is: some) . Eve + 1- + a box 6 to significan a for that impaint welling a si w M
 - (1) (4, -7, -9)
- (2) (4, 7, 9)
- (3) (3, -5, -3)

- (4) (-3, 5, 3)
- 66. The coordinates of the centroid of the triangle ABC, where A, B, C are the points of intersection of the plane 6x + 3y - 2z = 18 with the coordinate axes are:
- (1) (-1,2,3)
 - (3) (-1, -2, -3)

- (4) (1, -2, 3)
- The points (8, -5, 6), (11, 1, 8), (9, 4, 2) and (6, -2, 0) are the vertices of a:
 - (1) Rhombus

(2) Rectangle

- (3) Parallelogram
- (4) Square
- The plane containing the two lines $\frac{x-3}{1} = \frac{y-2}{4} = \frac{z-1}{5}$ and $\frac{x-2}{1} = \frac{y+3}{-4} = \frac{z+1}{5}$ is 11x + my + nz = 28, where :
 - (1) m = -1, n = 3
- (2) m = -1, n = -3
- (3) m = 1, n = 3 (4) m = 1, n = -3
- **69.** If $z = (\lambda + 3) + i\sqrt{(5 \lambda^2)}$; then the locus of z is:
 - (1) a Straight line
- (2) a Parabola
 - (3) a Circle
- (4) a Hyperbola

- **70.** If $8iz^3 + 12z^2 18z + 27i = 0$, (where $i = \sqrt{-1}$), then:
 - (1) $|z| = \frac{3}{2}$
- (2) $|z| = \frac{2}{3}$
- (3) |z| = 1at a distance of 6 from the point (2, -3, -5)
- (4) $|z| = \frac{3}{4}$ and soft no integral 3.28
- 71. If n is a positive integer but not a multiple of 3 and $z = -1 + i\sqrt{3}$, (where $i = \sqrt{-1}$), then $(z^{2n} + 2^n \cdot z^n + 2^{2n})$ is equal to : (5)
 - (1) -1
- (8, 2, 8-) (4) (2) 1
- (3) 2" The companion of the companion of

 - The value of α for which the equation $(\alpha + 5) x^2 (2\alpha + 1)x + (\alpha 1) = 0$ has roots 72. equal in magnitude but opposite in sign, is:

 - (1) -5 and (0, -2, 0) and (1), 1, 8), $(\frac{1}{2} \frac{1}{2})$ and (6, -2, 0) are the various of -2.
 - $(3) \frac{7}{4}$

- (4) 1
- 73. Let α , β be the roots of the equation (x-a)(x-b)=c, $c\neq 0$. Then the roots of the equation $(x - \alpha)(x - \beta) + c = 0$ are:
 - (1) a, c
- (2) b, c
- (3) a, b
- a + c, b + c
- If α , β are the roots of the equation $x^2 + x\sqrt{\alpha} + \beta = 0$, then the values of α and β are:
 - (1) $\alpha = 1, \beta = -2$
- and the first α (2) $\alpha = 1$, $\beta = -1$ and adjusted α (1)
- (3) $\alpha = 2$, $\beta = 1$
- and the property (4) $\alpha = 2$, $\beta = -2$

. The number of diagonals that can be	drawn in an octagon is:
(1) 16	(2) 18
(3) 28	(4) 20
	E FOS
	then the minimum value of $\lfloor n \cdot \lfloor 21 - n \rfloor$ is:
(1) <u>[20</u>	(2) <u>10</u> · <u>11</u>
(3) [21	82. If cos x + cos x + cos x = 311 ca x + x
- Proper Chambell Shipping	10
The number of and 1	Albert Control of the second state of the second
and 5, no digit being repeated is:	000 that can be formed out of the digits 0, 1, 2, 4
(1) 69	(2) 130
(3) 68	(4) None of these
The number of six digit numbers tha 7, so that digits don't repeat and the to	t can be formed from the digits 1, 2, 3, 4, 5, 6 and erminal digits are even is
(1) 720	(2) 72
(3) 288	(4) 144
The total number of the state o	100
is:	ansion of $(x+a)^{100} + (x-a)^{100}$ after simplification
(1) 50 a and rated in and we	(2) 51 miles for to only med add. As
(3) 150	(4) 102 (H.) Investra
men a possible value for n is:	usion of $(2x^{-1} + x^2)^n$ has a term independent of x,
men a possible value for n is:	asion of $(2x^{-1} + x^2)''$ has a term independent of x , (2) 16
(1) 22	
(1) 22 (3) 10	(2) 16
	(1) 16 (3) 28 If n is an integer between 0 and 21, to (1) 20 (3) 21 The number of numbers less than 1 and 5, no digit being repeated is: (1) 69 (3) 68 The number of six digit numbers than 7, so that digits don't repeat and the to (1) 720 (3) 288 The total number of terms in the expansis: (1) 50 (3) 150

- The value of 'a' for which $ax^2 + \sin^{-1}(x^2 2x + 2) + \cos^{-1}(x^2 2x + 2) = 0$ has a real solution, is:
 - (1) $\frac{2}{\pi}$

(2) $-\frac{2}{}$

- (4) $-\frac{\pi}{2}$
- If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = 3\pi$, then xy + yz + zx is equal to :
 - (1) 0

(2) -3

- (3) 3
- the number of numbers less than 1000 that can be formed out of the digits 0. a
- The value of tan $\left\{ \left(\cos^{-1} \left(-\frac{2}{7} \right) \frac{\pi}{2} \right) \right\}$ is: 83. The number of six digit contiers that use to formed from the digits 1, 2, 3, 4, 6, 6 and
 - (1) $\frac{2}{3\sqrt{5}}$

listimmed self bare temper throb seligib tech on .

- $(4) \ \frac{4}{\sqrt{5}}$
- The least value of 'a' for which $\frac{4}{\sin x} + \frac{1}{1 \sin x} = a$ has at least one solution in the interval $\left(0,\frac{\pi}{2}\right)$ is:
 - (1) 8

(2) 9

(3) 4

(4) 3

- A spherical baloon is pumped at the rate of 10 inch³/min. If radius of baloon is 15 inch, then the rate of increase of its radius is:
 - (1) $\frac{1}{30\pi}$ inch/min

(2) $\frac{1}{120\pi}$ inch/min

(3) $\frac{1}{60\pi}$ inch/min

- (4) $\frac{1}{90\pi}$ inch/min (E)
- The order of the differential equation whose general solution is given by : 86.

 $y = (c_1 + c_2) \cos(x + c_3) - c_4$. $e^{x + c_5}$, where c_1, c_2, c_3, c_4 and c_5 are arbitrary constant, is:

(1) 5

- (3) 3
- ne (xems) (0) (4) 2 (4) 2 (1)
- The real value of n for which the substitution $y = u^n$ will transform the differential equation $2x^4y\frac{dy}{dx} + y^4 = 4x^6$ into a homogeneous equation is:
 - (1) $\frac{3}{2}$ (2) $\frac{3}{2}$ (2) $\frac{3}{2}$ (2) $\frac{3}{2}$

 $(3) \frac{1}{2}$

- The differential equation representing the family of the curves $y^2 = 2c (x + \sqrt{c})$, where c is a positive parameter, is of:
 - (1) order 2, degree 2

(2) order 1, degree 3

- (3) order 3, degree 1
- (4) None of these

- 89. The solution of the differential equation $\sin y \frac{dy}{dx} = \cos y (1 x \cos y)$ is:
 - (1) $\sec y = x 1 ce^x$ (2) $\sec y = x + e^x + c$

 - (3) $\sec y = x 1 + ce^x$
 - (4) $\sec y = x + 1 + ce^x$
- **90.** $\int \frac{3+2\cos x}{(2+3\cos x)^2} dx$ is equal to :
 - $(1) \left(\frac{2\cos x}{2+3\sin x}\right) + c \qquad (2) \left(\frac{2\cos x}{2+3\cos x}\right) + c$

- $(3) \left(\frac{\sin x}{2 + 3\cos x}\right) + c \qquad (4) \left(\frac{\sin x}{3 + 2\cos x}\right) + c$
- **91.** If λ is a non-real cube root of -2, then the value of $\begin{vmatrix} \lambda^2 & 1 & 3\lambda^2 \\ 2 & 2\lambda & 1 \end{vmatrix}$ is equal to:
 - (1) -10

(2) -13

(3) -11

- 3+2i 5-i 7-3i to winner and succession molecules (alternative interest) **92.** If z = i 2i -3i, where $i = \sqrt{-1}$, then z is: 3-2i 5+i 7+3i
 - (1) Purely Real
- E portion I, degree 3 (2) Purely Imaginary

· (3) order 3, define [.

(3) 1

300 (4) (4) 0

93. The value of the determinant
$$\begin{vmatrix} 1 & e^{i\pi/3} & e^{i\pi/4} \\ e^{-i\pi/3} & 1 & e^{2i\pi/3} \\ e^{-i\pi/4} & e^{-2i\pi/3} & 1 \end{vmatrix}$$
, where $i = \sqrt{-1}$ is:

(1)
$$2 + \sqrt{2}$$

(2)
$$2-\sqrt{3}$$

(3)
$$2 + \sqrt{3}$$

(4)
$$-(2+\sqrt{2})$$

94. If A is a skew-symmetric matrix, then trace of A is:

$$(1) -1$$

(4) i

95. If
$$A = \begin{bmatrix} \cos x & \sin x & 0 \\ -\sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix} = f(x)$$
, then A^{-1} is equal to:

$$(1) f(x)$$

(2) f(-x)

$$(3) - f(x)$$

(4) 0

96. If $A^2 + A - I = 0$, then A^{-1} is equal to :

(2) A + I

(4) 0

97. If
$$x^y$$
, $y^x = 16$, then $\frac{dy}{dx}$ at (2, 2) is:

(1) 0

(2) 1

(3) -1

 $(4) \frac{1}{2}$

- **98.** If $x^2 + y^2 = t \frac{1}{t}$ and $x^4 + y^4 = t^2 + \frac{1}{t^2}$, then $x^3 y \frac{dy}{dx}$ is equal to :
 - (1) 1

(2) -1

(3) 0

- $(4) \frac{1}{2}$
- **99.** If $y = \tan^{-1} \left[\frac{\log_e(e/x^2)}{\log_e(ex^2)} \right] + \tan^{-1} \left[\frac{3 + 2\log_e x}{1 6\log_e x} \right]$, then $\frac{d^2 y}{dx^2}$ is:
 - (1) -1

(2) 1

(3) ∞

- (4) 0
- 100. The locus of all points on the curve $y^2 = 4a\left[x + a\sin\left(\frac{x}{a}\right)\right]$ at which the tangent is parallel to x-axis is:
 - (1) Ellipse

(2) Hyperbola

(3) Parabola

(4) Circle

THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO) SET-X PG-EE-2022

SUBJECT: Mathematics Hons. (Five Year)

A Pleasure of a fee which		Sr. No
Time : 11/4 Hours Roll No. (in figures)	Max. Marks: 100	Total Questions : 100
Name Mother's Name	Father's Name	
(Signature of the Candidate)		(Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

- 1. All questions are compulsory.
- 2. The candidates must return the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfairmeans / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
- 3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
- 4. Question Booklet along with answer key of all the A, B, C & D code will be got uploaded on the University website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet/Answer Key, the same may be brought to the notice of the Controller of Examinations in writing/through E.Mail (coe@mdurohtak.ac.in) within 24 hours of uploading the same on the University Website. Thereafter, no complaint in any case, will be considered.
- 5. The candidate must not do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers must not be ticked in the question booklet.
- 6. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
- 7. Use only Black or Blue Ball Point Pen of good quality in the OMR Answer-Sheet.
- 8. Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

- If n is a positive integer but not a multiple of 3 and $z = -1 + i\sqrt{3}$, (where $i = \sqrt{-1}$), then $(z^{2n} + 2^n, z^n + 2^{2n})$ is equal to:
 - (1) -1

 $(3) 2^{n}$

- The value of α for which the equation $(\alpha + 5) x^2 (2\alpha + 1)x + (\alpha 1) = 0$ has roots equal in magnitude but opposite in sign, is:
 - (1) -5

- Let (3) $\frac{7}{4}$ $\stackrel{?}{\searrow}$ I study and recorded as (4) 1 resonantiquity six to reduce self-

 - 3. Let α , β be the roots of the equation (x-a)(x-b)=c, $c\neq 0$. Then the roots of the equation $(x - \alpha)(x - \beta) + c = 0$ are:

(2) b, c

(3) a, b

- (4) a + c, b + c
- **4.** If α , β are the roots of the equation $x^2 + x\sqrt{\alpha} + \beta = 0$, then the values of α and β are :
 - (1) $\alpha = 1, \beta = -2$ (2) $\alpha = 1, \beta = -1$

(3) $\alpha = 2, \beta = 1$

- The number of diagonals that can be drawn in an octagon is:
 - (1) 16

(2) 18

(3) 28

11. The value of 'a' for which $ax^2 + \sin^{-1}(x^2 - 2x + 2) + \cos^{-1}(x^2 - 2x + 2) = 0$ has a real solution, is:

(2) $-\frac{2}{\pi}$ (3) $\frac{\pi}{2}$ (4) $-\frac{\pi}{2}$

- If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = 3\pi$, then xy + yz + zx is equal to:
 - (1) 0

(3) 3

- E (4) -1
- **13.** The value of $\tan \left\{ \left(\cos^{-1} \left(-\frac{2}{7} \right) \frac{\pi}{2} \right) \right\}$ is:
 - (1) $\frac{2}{3\sqrt{5}}$
- $\frac{1}{2}$ (2) $\frac{2}{\sqrt{3}}$ (2)
- The differential equation representing the family of the curves $y' = 2x(x + \sqrt{5})$, where $x = \sqrt{3}$ (2) $\frac{3}{\sqrt{5}}$ (3)
- The least value of 'a' for which $\frac{4}{\sin x} + \frac{1}{1 \sin x} = a$ has at least one solution in the interval $\left(0,\frac{\pi}{2}\right)$ is:
 - (1) 8

(2) 9

(3) 4

- (4) 3
- A spherical baloon is pumped at the rate of 10 inch³/min. If radius of baloon is 15 inch, then the rate of increase of its radius is:
 - (1) $\frac{1}{30\pi}$ inch/min

- (2) $\frac{1}{120\pi}$ inch/min
- (3) $\frac{1}{60\pi}$ inch/min (4) $\frac{1}{90\pi}$ inch/min

 $y = (c_1 + c_2)\cos(x + c_3) - c_4$, $e^{x + c_5}$, where c_1 , c_2 , c_3 , c_4 and c_5 are arbitrary constant, is:

(1) 5

(3) 3

(4) 2

The real value of n for which the substitution $y = u^n$ will transform the differential equation $2x^4y\frac{dy}{dx} + y^4 = 4x^6$ into a homogeneous equation is:

- $(1) \frac{3}{2}$
- (2) $\frac{5}{2}$ (3) $\frac{1}{2}$

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C

The differential equation representing the family of the curves $y^2 = 2c (x + \sqrt{c})$, where 18. c is a positive parameter, is of:

(1) order 2, degree 2

(2) order 1, degree 3

(3) order 3, degree 1

(4) None of these

The solution of the differential equation $\sin y \frac{dy}{dx} = \cos y (1 - x \cos y)$ is:

- (1) $\sec y = x 1 ce^x$
- (2) $\sec y = x + e^x + c$
- (3) $\sec y = x 1 + ce^x$

(4) $\sec y = x + 1 + ce^x$

20. $\int \frac{3+2\cos x}{(2+3\cos x)^2} dx$ is equal to :

- $(1) \left(\frac{2\cos x}{2+3\sin x}\right) + c \qquad (2) \left(\frac{2\cos x}{2+3\cos x}\right) + c$
- (3) $\left(\frac{\sin x}{2+3\cos x}\right)+c$
- $(4) \left(\frac{\sin x}{3 + 2\cos x}\right) + c$

21. If
$$\lambda$$
 is a non-real cube root of -2 , then the value of $\begin{vmatrix} 1 & 2\lambda & 1 \\ \lambda^2 & 1 & 3\lambda^2 \\ 2 & 2\lambda & 1 \end{vmatrix}$ is equal to

(1) -10

(2) -13

(3) -11

22. If
$$z = \begin{vmatrix} 3+2i & 5-i & 7-3i \\ i & 2i & -3i \\ 3-2i & 5+i & 7+3i \end{vmatrix}$$
, where $i = \sqrt{-1}$, then z is:

(1) Purely Real

(2) Purely Imaginary

- (3) 1

23. The value of the determinant
$$\begin{vmatrix} 1 & e^{i\pi/3} & e^{i\pi/4} \\ e^{-i\pi/3} & 1 & e^{2i\pi/3} \\ e^{-i\pi/4} & e^{-2i\pi/3} & 1 \end{vmatrix}$$
, where $i = \sqrt{-1}$ is:

(1) $2 + \sqrt{2}$

(2) $2 - \sqrt{3}$

- (3) $2 + \sqrt{3}$ (4) $-(2 + \sqrt{2})$

24. If A is a skew-symmetric matrix, then trace of A is:

(1) -1

(2) 1

(3) 0

25. If
$$A = \begin{bmatrix} \cos x & \sin x & 0 \\ -\sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix} = f(x)$$
, then A^{-1} is equal to :

(1) f(x)

- (2) f(-x)
- (3) -f(x)

(E) Firmula (4) 0

- If $A^2 + A I = 0$, then A^{-1} is equal to:
 - (1) A-I

(3) I

- **27.** If x^y , $y^x = 16$, then $\frac{dy}{dx}$ at (2, 2) is:

(3) -1

- $(4) \frac{1}{2}$
- **28.** If $x^2 + y^2 = t \frac{1}{t}$ and $x^4 + y^4 = t^2 + \frac{1}{t^2}$, then $x^3 y \frac{dy}{dx}$ is equal to :

(3) 0

- $(4) \frac{1}{2}$
- If $y = \tan^{-1} \left[\frac{\log_e(e/x^2)}{\log_e(ex^2)} \right] + \tan^{-1} \left[\frac{3 + 2\log_e x}{1 6\log_e x} \right]$, then $\frac{d^2 y}{dx^2}$ is:
 - (1) -1

(2) 1

(3) ∞

- (4) 0
- The locus of all points on the curve $y^2 = 4a\left[x + a\sin\left(\frac{x}{a}\right)\right]$ at which the tangent is 30. parallel to x-axis is:
 - (1) Ellipse

(2) Hyperbola

(3) Parabola

(4) Circle

31. In a city 20 per cent of the population travels by car, 50 per cent travels by bus and 10 per cent travels by both car and bus. Then persons travelling by car or bus is:		
	(1) 40 per cent	(2) 60 per cent
	(3) 70 per cent	(4) 80 per cent
32.	Let $n(U) = 700$, $n(A) = 200$, $n(B) = 300$ a	and $n(A \cap B) = 100$, then $n(A^C \cap B^C)$ is:
	(1) 600	(2) 400 - 10 mollogar off 488
	(3) 200	(4) 300
33.	If A and B are two sets, then $A \cup B = A$	
	(1) A⊆B	(2) B⊆A
		(4) None of these
34.	The Relation R in N defined by ${}_{a}R_{b} \Leftrightarrow a$	$a^2 - 4ab + 3b^2 = 0$, $(a, b \in N)$ is:
	(1) Reflexive	(2) Symmetric
orin s	(3) Transitive All to auxiliary and department	(4) None of these
35.	If $0 < a < b$, then $\lim_{n \to \infty} (b^n + a^n)^{1/n}$ is equal	al to:
	(1) e	(2) b
	(3) $a = \frac{1}{2} \frac{y_0}{2} + \frac{y_0}{2} $ significant	(4) None of these
36.	The set of all points, where $f(x) = 3\sqrt{x^2}$	x - x - 1 is not differentiable is:
	(1) {0}	(2) {-1, 0, 1}
	(3) {0, 1}	(4) None of these
G-EI	E-2022/(Mathematics Hons.)(Five Yr.)-	(SET-X)/(C)

- (1) $r \pi + \frac{\pi}{12}, r \in I$
- (2) $r \pi + \frac{\pi}{3}, r \in I$
 - (3) $r \pi \pm \frac{\pi}{6}$, $r \in I$ (4) None of these

38. The negation of $p \rightarrow q$ is:

(1) $p \wedge \sim q$

(3) $q' \rightarrow p$

The disjunction $p \vee q$ is false only when:

(1) p is false

- (2) q is false
- (3) p and q are both false (4) None of these

If $A = \{1, 3, 5, 7\}$, $B = \{2, 5\}$, then the number of relations from A to B is:

- (1) 256
- (2) 128 (3) 64
- (4) 32

C

41. Radius of the largest circle which passes through the focus of the parabola $y^2 = 4x$ and contained in it, is:

(1) 2

(3) 8

(4) 5

The distances from the foci of P(a, b) on the ellipse $\frac{x^2}{9} + \frac{y^2}{25} = 1$ are:

- (1) $4 \pm \frac{5}{4}b$ (2) $5 \pm \frac{4}{5}a$
- (3) $5 \pm \frac{4}{5}b$ (4) None of these

43. Two conics $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $x^2 = -\frac{a}{b}y$ intersect, if:

(1)
$$a^2 < \frac{1}{4}$$

(2)
$$a^2 > \frac{1}{4}$$

(3)
$$a^2 = \frac{1}{4}$$

The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$, and having its centre (0, 3) is:

(2)
$$\sqrt{3}$$

The locus of the point, the sum of squares of whose distance, from the planes x - z = 0, x - 2y + z = 0 and x + y + z = 0 is 36 is given by :

(1)
$$x^2 + y^2 + z^2 = 6$$

(1)
$$x^2 + y^2 + z^2 = 6$$
 (2) $x^{-2} + y^{-2} + z^{-2} = \frac{1}{36}$

(3)
$$x^2 + y^2 + z^2 = 36$$

(4)
$$x^2 + y^2 + z^2 = 216$$

The equation of the plane through the point (2, 5, -3) perpendicular to the planes x + 2y + 2z = 1 and x - 2y + 3z = 4 is:

(1)
$$3x - 4y + 2z = 20$$

(2)
$$10x - y - 4z = 27$$

$$(3) 3x + 4y - 2z = 20$$

$$(4) 10x + y + 4z = 27$$

- A line makes angles α , β , γ , δ with the four diagonals of a cube. Then $\cos^2 \alpha + \cos^2 \beta$ $+\cos^2\gamma + \cos^2\delta$ is:
 - $(1) \frac{4}{3}$

(2) $\frac{1}{3}$

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

- $(4) \frac{3}{4}$
- The symmetric form of the equations of the line x + y z = 1, 2x 3y + z = 2 is:

 - (1) $\frac{x}{2} = \frac{y}{3} = \frac{z}{5}$ (2) $\frac{x}{2} = \frac{y}{3} = \frac{z-1}{5}$
 - (3) $\frac{x}{3} = \frac{y}{2} = \frac{z}{5}$
- (4) $\frac{x-1}{2} = \frac{y}{3} = \frac{z}{5}$
- If $A = \cos(\cos x) + \sin(\cos x)$, the least and greatest value of A are:
 - (1) 0 and 2

(2) -1 and 1

- (3) $-\sqrt{2}$ and $\sqrt{2}$ (4) $\frac{1}{\sqrt{2}}$ and $\sqrt{2}$
- The least value of $\csc^2 x + 25 \sec^2 x$ is:
- priprint of the plane, (2) mion (2) 36 only and to not upo off
- (3) 34

- (4) 32
- If $|\vec{a}| = 3$, $|\vec{b}| = 4$ and $|\vec{a} + \vec{b}| = 5$, then $|\vec{a} \vec{b}|$ is equal to:
 - (1) 5

(2) 4

(3) 2

(4) 1

- **52.** If $(\vec{a} \times \vec{b})^2 + (\vec{a} \cdot \vec{b})^2 = 144$ and $|\vec{a}| = 4$, then $|\vec{b}|$ is equal to :
 - (1) 4

- (3) 1
- (4) 2
- **53.** Let $|\vec{a}| = 1$, $|\vec{b}| = 2$, $|\vec{c}| = 3$ and $\vec{a} \perp (\vec{b} + \vec{c})$, $\vec{b} \perp (\vec{c} + \vec{a})$, $\vec{c} \perp (\vec{a} + \vec{b})$. Then $|\vec{a} + \vec{b} + \vec{c}|$ is:
 - $(1) \sqrt{10}$

 $\sqrt{12}$ $\sqrt{12$

 $(3) \sqrt{8}$

- $(4) \sqrt{14}$
- **54.** Let $\vec{a}, \vec{b}, \vec{c}$ be three vectors such that $\vec{a} \neq 0$ and $\vec{a} \times \vec{b} = 2\vec{a} \times \vec{c}, |\vec{a}| = |\vec{c}| = 1, |\vec{b}| = 4$ and $|\vec{b} \times \vec{c}| = \sqrt{15}$. If $\vec{b} - 2\vec{c} = \lambda \vec{a}$, then λ is equal to :
 - (1) 1
- (2) 3 (3) -4 (4) 2
- The point on the line $\frac{x-2}{1} = \frac{y+3}{-2} = \frac{z+5}{-2}$ at a distance of 6 from the point (2, -3, -5)is:
 - (1) (4, -7, -9) support them + (2) (4, 7, 9) and the + (3 min + 1) min + (4 min + 1) min + (5 min + 1) min + (5 min + 1) min + (6 min + 1) min + (6 min + 1) min + (7 min + 1) min + (8 min + 1)

(3) (3, -5, -3)

- (4) (-3, 5, 3)
- The coordinates of the centroid of the triangle ABC, where A, B, C are the points of intersection of the plane 6x + 3y - 2z = 18 with the coordinate axes are:

 - (1) (-1, 2, 3)
 - (3) (-1, -2, -3)

- (4) (1, -2, 3)
- The points (8, -5, 6), (11, 1, 8), (9, 4, 2) and (6, -2, 0) are the vertices of a:
 - (1) Rhombus

(2) Rectangle

(3) Parallelogram

(1) m = -1, n = 3

(2) m = -1, n = -3

- (3) m = 1, n = 3 (4) m = 1, n = -3

59. If $z = (\lambda + 3) + i\sqrt{(5 - \lambda^2)}$; then the locus of z is:

- (1) a Straight line
- (2) a Parabola

(3) a Circle

(4) a Hyperbola

60. If $8iz^3 + 12z^2 - 18z + 27i = 0$, (where $i = \sqrt{-1}$), then:

- (1) $|z| = \frac{3}{2}$ (4)
- (2) $|z| = \frac{2}{3}$

- (3) |z| = 1 (4) $|z| = \frac{3}{4}$

61. If $\sin \theta_1 + \sin \theta_2 + \sin \theta_3 = 3$, then $\cos \theta_1 + \cos \theta_2 + \cos \theta_3$ is equal to:

(1) 0

- timesection of the plane for \$ (4) 3 . If a sit and a subtraction is

62. If $\tan x \tan y = a$ and $x + y = \frac{\pi}{6}$, then $\tan x$ and $\tan y$ satisfy the equation :

- (1) $x^2 \sqrt{3} (1-a)x + a = 0$
- (2) $x^2 + \sqrt{3} (1-a)x + a = 0$
 - (3) $\sqrt{3}x^2 + (1+a)x a\sqrt{3} = 0$
 - (4) $\sqrt{3}x^2 (1-a)x + a\sqrt{3} = 0$

- 63. Fifteen coupons are numbered 1, 2, 3,, 15 respectively. Seven coupons are selected at random one at a time with replacement. The probability that the largest number appearing on a selected coupon is atmost 9, is:
 - (1) $\left(\frac{1}{15}\right)^{\prime}$

 $(2) \left(\frac{8}{15}\right)^7$

(3) $\left(\frac{3}{5}\right)$

- $(4) \left(\frac{4}{5}\right)^7$
- The probability of guessing correctly at least 8 out of 10 answers on a true-false 64. examination, is:
 - (1) $\frac{7}{128}$ (2) $\frac{7}{64}$

 $(3) \frac{45}{1024}$

- (4) $\frac{175}{1024}$
- A fair die is thrown untill a score of less than five points is obtained. The probability of obtaining less than three points on the last throw is:

- Two players A and B throw a die alternately for a prize of Rs. 11, which is to be won by a player who first throws a six. If A starts the game, their respective expectations are:
 - (1) Rs. 7; Rs. 4

(2) Rs. 8: Rs. 3

(3) Rs. 6; Rs. 5

- (4) Rs. 6; Rs. 5
- The mean of 8 observations is 9 and their variance is 9.25. If six of the observations are 6, 7, 10, 12, 12 and 13, then the remaining two observations are:
 - (1) 8, 6

(2) 8, 5

(3) 8, 4

(4) 8, 3

(1) n + p

	$(3) \frac{n}{n}$	(4) n-p	
	P		
69.	Which of the following is not	a merit of Mean Deviation?	
	(1) It is unduly affected by th	e presence of entreme trems	64. The probability requirestant is
	(2) It is based on all the items	The state of the s	
	(3) It can be calculated by us	ing any average	
	(4) None of these		
70.	The variance of 20 observation new variance of the resulting	ons is 5. If each observation is mu observations.	ltiplied by 2, find the
	(1) 100	(2) 50	
	(3) 40	(4) 20	
71.	The range of the function $f(x)$	$= 3 \sin x - 2 \cos x \text{ is :}$	
		(2) [-2, 3] maple 1 lin	
	(3) [-3, 2]	(4) $[3, \sqrt{13}]$	
		(4) [3, √13]	
72.	Let $f: R \to \left[0, \frac{\pi}{2}\right]$ be a func	tion defined by $f(x) = \tan^{-1}(x^2 + x + x)$	+a). If f is onto, then
		destructions is 9 and their variance in	
	(1) $\frac{1}{4}$	(2) $\frac{1}{2}$	

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(3) 1 (4) 0

68. The frequencies of values 0, 1, 2,, n of a variable are q^n , $c_1 q^{n-1} p^2$,, p^n , where p + q = 1. The mean is:

- 73. If the domain of f(x) is (0, 1), then the domain of $f(e^x) + f(\ln |x|)$ is:
 - (1) (-1, e)

C

(3) (-e, 1)

- (4) (1, e)
- Let $f: R \to R$ be a function defined by $f(x) = \frac{x^2 + 2x + 5}{x^2 + x + 1}$. The function f(x) is:
 - (1) one-one and into

(2) one-one and onto

(3) many one and onto

- (4) many one and into
- The probability that at least one of the events A and B occurs is $\frac{3}{5}$. If A and B occur simultaneously with probability $\frac{1}{5}$, then $P(\overline{A}) + P(\overline{B})$ is:
 - (1) $\frac{2}{5}$
- (2) $\frac{4}{5}$ (3) $\frac{6}{5}$
- A bag contains 16 coins of which two are counterfeit with heads on both sides. The rest are fair coins. One is selected at random from the bag and tossed. The probability of getting a head is:
 - $(1) \frac{9}{16}$

- (2) $\frac{11}{16}$
- (3) $\frac{13}{16}$ (4) $\frac{15}{16}$
- An urn contains five balls. Two balls are drawn and are found to be white. The probability that all the balls are white is:
 - $(1) \frac{2}{5}$

(2) $\frac{1}{2}$ (4) $\frac{1}{3}$

(3) $\frac{3}{5}$

- A box contains 6 nails and 10 nuts. Half of the nails and half of the nuts are rusted. If one item is chosen at random, the probability that it is rusted or is a nails is:
 - $(1) \frac{3}{16}$

- $\frac{5}{16}$
- (3) $\frac{9}{16}$ realizable of $\frac{2842}{1822}$ = (1) (4) $\frac{11}{16}$
- The maximum value of P = 6x + 8y subject to constraints $2x + y \le 30$, $x + 2y \le 24$. $x \ge 0, y \ge 0$ is:
 - (1) 90

(2) 96

(3) 120

- 80. The number of proper subsets of the set $\{1, 2, 3\}$ is:
 - (1) 6

- (3) 8 a filed no absent allow his restaurce or (4), 9 students in action of ambitude who A.
- **81.** Let f(x) be a differential function for all x. If f(1) = -2 and $f'(x) \ge 2$ for all x in [1, 6], then minimum value of f(6) is equal to :
 - (1) 4

(2) 6

(3) 2

- The minimum value of $\left(1 + \frac{1}{\sin^n \alpha}\right) \left(1 + \frac{1}{\cos^n \alpha}\right)$ is equal to :
 - (1) 1

(2) $(1+2^{n/2})^2$

(3) - 1

 $(4) \ \frac{1+2^{n/2}}{1-2^{n/2}}$

If $\int f(x)\cos x \, dx = \frac{1}{2} \{f(x)\}^2 + c$, then f(x) is given by:

- (1) $\sin x + c$
- $(2) \cos x + c$

(3) x + c

84. $\int (x-\frac{11}{c_1}x^2+\frac{11}{c_2}x^3-\frac{11}{c_3}x^4+\dots-\frac{11}{c_{11}}x^{12})\,dx$ is equal to:

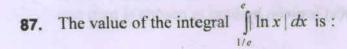
- (1) $\frac{(1-x)^{13}}{13} \frac{(1-x)^{12}}{12} + c$ (2)
 - (2) $\frac{(1-x)^{12}}{12} + \frac{(1-x)^{13}}{13} + c$
- (3) $\frac{(1-x)^{13}}{12} + \frac{(1-x)^{12}}{13} + c$
- (4) None of these

85. If $\int_{0}^{1} \frac{e^{t}}{t+1} dt = a$, then $\int_{b-1}^{b} \frac{e^{-t}}{t-b-1} dt$ is equal to:

- (1) ae^{-b}
- time pe $\frac{0}{\log t}$ (E) (2) ae^b $\frac{1}{\log t}$ (1)
- $(3) ae^{-b}$

 $\lim_{\epsilon \to 0} \frac{\epsilon_1}{\max_{\epsilon \to 0} (\epsilon)} (4) - be^{-a}$ The value of $\int_0^x [x^2 - x + 1] dx$ (where $[\cdot]$ denotes the greatest integer function) is given by:

- (1) $\frac{7-\sqrt{5}}{2}$ (2) $\frac{8-\sqrt{5}}{2}$
 - (3) $\frac{6-\sqrt{5}}{2}$
- (4) $\frac{5-\sqrt{5}}{2}$



(1)
$$1 - \frac{1}{e}$$

(2)
$$2\left(1-\frac{1}{e}\right)$$

(3)
$$\frac{1}{e} - 1$$

(4)
$$(e-1)^{-1}$$

The area bounded by $y = \frac{\sin x}{x}$, x - axis and the ordinates x = 0, $x = \frac{\pi}{4}$ is:

$$(1) = \frac{\pi}{4}$$

(2)
$$> \frac{\pi}{4}$$
(4) 0

$$(3) < \frac{\pi}{4}$$

The area between the curve $y = -x^2 + 2x^4$, the x-axis and the ordinates of two minima of the curve is:

(1)
$$\frac{7}{120}$$
 sq unit

(2)
$$\frac{9}{120}$$
 sq unit

(3)
$$\frac{11}{120}$$
 sq unit

(4)
$$\frac{13}{120}$$
 sq unit

The value of f(0), so that the function $f(x) = \frac{1 - \cos(1 - \cos x)}{x^4}$ is continuous everywhere is:

(1)
$$\frac{1}{4}$$

(2)
$$\frac{1}{8}$$

(3)
$$\frac{1}{2}$$

- The term independent of x in the expansion of $[(t^{-1}-1)x+(t^{-1}+1)^{-1}x^{-1}]^8$ is:

 - (1) $70\left(\frac{1-t}{1+t}\right)^4$ (2) $70\left(\frac{1+t}{1-t}\right)^4$ (3) $56\left(\frac{1+t}{1-t}\right)^3$ (4) $56\left(\frac{1-t}{1+t}\right)^3$

- In the expansion of $(1+x)^{43}$, the coefficients of the (2r+1)th and (r+2)th terms are equal, then the value of r is:
 - (1) 16
- (2) 15 (3) 14 (4) 13 (4)
- An infinite G. P. has first term x and sum 5, then x belongs to:
 - (1) x < -10

- (2) 0 < x < 10
- (3) -10 < x < 0

 - 94. In the quadratic equation $ax^2 + bx + c = 0$, if $\Delta = b^2 4ac$ and $\alpha + \beta$, $\alpha^2 + \beta^2$, $\alpha^3 + \beta^3$ are in G.P., where α , β are the roots of $ax^2 + bx + c = 0$, then:
 - (1) $\Delta \neq 0$
- $(2) b\Delta = 0$
- (3) $\Delta = 0$ (4) $c\Delta = 0$ (4) $c\Delta = 0$ (4) $c\Delta = 0$
- then the point P(E, y.) lies on the lin **95.** If the sum of first n positive integers is $\frac{1}{5}$ times the sum of their squares, then n equals:
 - (1) 7
- (2) 8 (3) 5
- (4) 6
- **96.** If $\frac{a+bx}{a-bx} = \frac{b+cx}{b-cx} = \frac{c+dx}{c-dx}$ ($x \ne 0$), then a, b, c, d are in:
 - (1) AP

(2) GP

(3) HP

(4) None of these

The line 3x - 4y + 7 = 0 is rotated through an angle $\frac{\pi}{4}$ in the clockwise direction about 97. the point (-1, 1). The equation of the line in its new position is :

(1) 7y - x + 6 = 0

(2) 7y - x - 6 = 0(4) 7y + x + 6 = 0

(3) 7y + x - 6 = 0

98. The diagonals of the parallelogram whose sides are lx + my + n = 0, lx + my + n' = 0, mx + ly + n = 0, mx + ly + n' = 0 include an angle:

 $\frac{1}{3}$ = $\frac{1}$

(3) $\frac{\pi}{4}$

of equalities $\frac{\pi}{2}$ (4) $\frac{\pi}{2}$ (5)

99. If an equilateral triangle has one side given by x + y - 2 = 0 and its centroid is at the origin, then one vertex of the triangle is:

(2) (-2, 2)

(3) (2, -2)

(4) (-1, -1)

If each of the points $(x_1, 4)$, $(-2, y_1)$ lies on the line joining the points (2, -1), (5, -3), then the point $P(x_1, y_1)$ lies on the line:

(1) 2x + 6y + 1 = 0

(2) 2x + 3y - 6 = 0

(3) 6(x+y)-23=0 (4) 6(x+y)-25=0

Opened for scanning purpose of 11:51 Amon Total No. of Printed Pages : 21 (DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO) SET-X PG-EE-2022

SUBJECT: Mathematics Hons. (Five Year)

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		Sr. No
Time: 11/4 Hours	Max. Marks: 100	Total Questions: 100
Roll No. (in figures)	(in words)	
Name	Father's Name	
Mother's Name	Date of Examination	
(Signature of the Candidate)		(Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

- 1. All questions are compulsory.
- 2. The candidates must return the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfairmeans / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
- 3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
- 4. Question Booklet along with answer key of all the A, B, C & D code will be got uploaded on the University website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet/Answer Key, the same may be brought to the notice of the Controller of Examinations in writing/through E.Mail (coe@mdurohtak.ac.in) within 24 hours of uploading the same on the University Website. Thereafter, no complaint in any case, will be considered.
- 5. The candidate must not do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers must not be ticked in the question booklet.
- 6. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
- 7. Use only Black or Blue Ball Point Pen of good quality in the OMR Answer-Sheet.
- 8. Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

- 1. Let f(x) be a differential function for all x. If f(1) = -2 and $f'(x) \ge 2$ for all x in [1, 6], then minimum value of f(6) is equal to:
 - (1) 4

(3) 2

- 2. The minimum value of $\left(1 + \frac{1}{\sin^n \alpha}\right) \left(1 + \frac{1}{\cos^n \alpha}\right)$ is equal to :

(2) $(1+2^{n/2})^2$

- $(4) \frac{1+2^{n/2}}{1-2^{n/2}}$
- 3. If $\int f(x)\cos x \, dx = \frac{1}{2} \{f(x)\}^2 + c$, then f(x) is given by:

- (2) $\cos x + c$
- (3) x + c (4) c $\sin x + \cos x = 0$ (5) $\sin x + \cos x = 0$ (6) $\cos x + \cos x = 0$ (7) $\sin x + \cos x = 0$ (7) $\sin x + \cos x = 0$
- **4.** $\int (x {}^{11}c_1x^2 + {}^{11}c_2x^3 {}^{11}c_3x^4 + \dots {}^{11}c_{11}x^{12}) dx$ is equal to:
 - (1) $\frac{(1-x)^{13}}{13} \frac{(1-x)^{12}}{12} + c$ (2) $\frac{(1-x)^{12}}{12} + \frac{(1-x)^{13}}{12} + c$
 - (3) $\frac{(1-x)^{13}}{12} + \frac{(1-x)^{12}}{13} + c$
- (4) None of these
- 5. If $\int_{0}^{1} \frac{e^{t}}{t+1} dt = a$, then $\int_{0}^{b} \frac{e^{-t}}{t-b-1} dt$ is equal to:
 - (1) ae^{-b}

- $(3) ae^{-b}$
- $\lim_{n\to\infty} p = \frac{21}{n \leq 1} \quad (2) \quad ae^b \qquad \qquad \lim_{n\to\infty} p = \frac{11}{n \leq 1} \quad (4)$

- **6.** The value of $\int_{0}^{2} [x^2 x + 1] dx$ (where [·] denotes the greatest integer function) is given
 - (1) $\frac{7-\sqrt{5}}{2}$
- (2) $\frac{8-\sqrt{5}}{2}$
- (3) $\frac{6-\sqrt{5}}{2}$ (4) $\frac{5-\sqrt{5}}{2}$
- 7. The value of the integral $\int_{1/e} |\ln x| dx$ is:
 - (1) $1 \frac{1}{e}$

(2) $2\left(1-\frac{1}{e}\right)$

- $(3) \frac{1}{2} 1$
- (4) $(e-1)^{-1}$
- **8.** The area bounded by $y = \frac{\sin x}{x}$, x axis and the ordinates x = 0, $x = \frac{\pi}{4}$ is:
 - (1) $=\frac{\pi}{4}$ (2) $>\frac{\pi}{4}$ (3) $<\frac{\pi}{4}$ (4) 0

- The area between the curve $y = -x^2 + 2x^4$, the x-axis and the ordinates of two minima of the curve is:
 - (1) $\frac{7}{120}$ sq unit

(2) $\frac{9}{120}$ sq unit

(3) $\frac{11}{120}$ sq unit

(4) $\frac{13}{120}$ sq unit

10.	everywhere is:	nction $f(x) = \frac{1 - \cos(1 - \cos x)}{x^4}$ is continuous
	(1) $\frac{1}{4}$	(2) $\frac{1}{8}$
	(3) $\frac{1}{2}$	(4) None of these
11. In a city 20 per cent of the population travels by car, 50 per cent travels by 10 per cent travels by both car and bus. Then persons travelling by car or bus		travels by car, 50 per cent travels by bus and
	(1) 40 per cent	(2) 60 per cent
	(3) 70 per cent	(4) 80 per cent
12.	Let $n(U) = 700$, $n(A) = 200$, $n(B) = 300$	and $n(A \cap B) = 100$, then $n(A^C \cap B^C)$ is:
	(1) 600	(2) 400 Tal y = g/m initiagen adT 401
	(3) 200	(4) 300
13.	If A and B are two sets, then $A \cup B = A$	
	(1) A ⊆ B	(2) B⊆A shat if you a million jell aff . 21
	(3) $A = B$	(4) None of these
14.	The Relation R in N defined by ${}_{a}R_{b} \Leftrightarrow a$	$a^2 - 4ab + 3b^2 = 0$, $(a, b \in N)$ is:
		(2) Symmetric

(4) None of these

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D

(3) Transitive

- **15.** If 0 < a < b, then $\lim_{n \to \infty} (b^n + a^n)^{1/n}$ is equal to:
 - (1) e

(2) b

(3) a

- (4) None of these
- **16.** The set of all points, where $f(x) = 3\sqrt{x^2 |x|} |x| 1$ is not differentiable is :
 - $(1) \{0\}$
- result in send (b) (2) {-1, 0, 1}
- $(3) \{0, 1\}$

- (4) None of these
- 17. The points of discontinuity of the function $f(x) = \lim \frac{(2\sin x)^{2n}}{3^n (2\cos x)^{2n}}$ are given by :
 - (1) $r \pi + \frac{\pi}{12}, r \in I$ (2) $r \pi + \frac{\pi}{3}, r \in I$
 - (3) $r \pi \pm \frac{\pi}{6}$, $r \in I$ (4) None of these
- **18.** The negation of $p \rightarrow q$ is:
 - (1) $p \wedge \sim q$

(2) $q \rightarrow p$

(3) $q' \rightarrow p$

- $f(A) p \rightarrow q' \text{ and also over small born } A = A$
- **19.** The disjunction $p \vee q$ is false only when:
 - (1) p is false

- (2) q is false
- (3) p and q are both false
- (4) None of these
- **20.** If $A = \{1, 3, 5, 7\}$, $B = \{2, 5\}$, then the number of relations from A to B is:
 - (1) 256

(2) 128

(3)64

(4) 32

- **21.** If $\sin \theta_1 + \sin \theta_2 + \sin \theta_3 = 3$, then $\cos \theta_1 + \cos \theta_2 + \cos \theta_3$ is equal to:
 - (1) 0

(3) 2

- E 28 18 28 (C) (4) 3
- If $\tan x \tan y = a$ and $x + y = \frac{\pi}{6}$, then $\tan x$ and $\tan y$ satisfy the equation:

 - (1) $x^2 \sqrt{3} (1-a)x + a = 0$ (2) $x^2 + \sqrt{3} (1-a)x + a = 0$

 - (3) $\sqrt{3}x^2 + (1+a)x a\sqrt{3} = 0$ (4) $\sqrt{3}x^2 (1-a)x + a\sqrt{3} = 0$
- 23. Fifteen coupons are numbered 1, 2, 3,, 15 respectively. Seven coupons are selected at random one at a time with replacement. The probability that the largest number appearing on a selected coupon is atmost 9, is:
 - (1) $\left(\frac{1}{15}\right)'$

 $(2) \left(\frac{8}{15}\right)^7$

(3) $\left(\frac{3}{5}\right)^7$

- $(4) \left(\frac{4}{5}\right)^7$
- The probability of guessing correctly at least 8 out of 10 answers on a true-false 24. examination, is:
 - $(1) \frac{7}{128}$

 $(3) \frac{45}{1024}$

- (4) $\frac{175}{1024}$ was balalusing at any 1 (5)
- A fair die is thrown untill a score of less than five points is obtained. The probability of obtaining less than three points on the last throw is:

(3) $\frac{4}{5}$

- Two players A and B throw a die alternately for a prize of Rs. 11, which is to be won by a player who first throws a six. If A starts the game, their respective expectations are:
 - (1) Rs. 7; Rs. 4

(2) Rs. 8; Rs. 3

- (3) Rs. 6; Rs. 5
- (4) Rs. 6; Rs. 5
- The mean of 8 observations is 9 and their variance is 9.25. If six of the observations are 27. 6, 7, 10, 12, 12 and 13, then the remaining two observations are:
 - (1) 8, 6 (2) 8, 5

- (3) 8, 4
- there one as a nimit with depleterment. You probabilly this the new re-The frequencies of values 0, 1, 2,, n of a variable are q^n , c_1^n , q^{n-1} , q^{n-1} , q^{n-1} , q^{n-2} p^{2} ,, p^{n} , where p + q = 1. The mean is:
 - (1) n + p

- Which of the following is not a merit of Mean Deviation?
 - (1) It is unduly affected by the presence of extreme items
 - (2) It is based on all the items
 - (3) It can be calculated by using any average
 - (4) None of these
- 28. A first the schrotyn untill a source of less than five points is actain The variance of 20 observations is 5. If each observation is multiplied by 2, find the new variance of the resulting observations.
 - (1) 100

(2) 50

(3) 40

(4) 20

- The term independent of x in the expansion of $[(t^{-1}-1)x+(t^{-1}+1)^{-1}x^{-1}]^8$ is:

 - (1) $70\left(\frac{1-t}{1+t}\right)^4$ (2) $70\left(\frac{1+t}{1-t}\right)^4$
 - (3) $56\left(\frac{1+t}{1-t}\right)^3$ (4) $56\left(\frac{1-t}{1+t}\right)^3$
- In the expansion of $(1+x)^{43}$, the coefficients of the (2r+1)th and (r+2)th terms are equal, then the value of r is:
 - (1) 16
- (2) 15 (3) 14
- (4) 13
- An infinite G. P. has first term x and sum 5, then x belongs to: 33.
 - (1) x < -10

- (2) 0 < x < 10
- (3) -10 < x < 0
- x > 0
- In the quadratic equation $ax^2 + bx + c = 0$, if $\Delta = b^2 4ac$ and $\alpha + \beta$, $\alpha^2 + \beta^2$, $\alpha^3 + \beta^3$ are in G.P., where α , β are the roots of $ax^2 + bx + c = 0$, then:
 - (1) $\Delta \neq 0$

(2) $b\Lambda = 0$

- -) adming all aminor and admin (4) $c\Delta = 0$
- then the point A(x, y,) lies on the line 1. **35.** If the sum of first n positive integers is $\frac{1}{5}$ times the sum of their squares, then n equals:
- (1) 7 (2) 8 (3) 5
- (4) 6
- **36.** If $\frac{a+bx}{a-bx} = \frac{b+cx}{b-cx} = \frac{c+dx}{c-dx}$ ($x \neq 0$), then a, b, c, d are in:
 - (1) AP

(2) GP

(3) HP

(4) None of these

- The line 3x 4y + 7 = 0 is rotated through an angle $\frac{\pi}{4}$ in the clockwise direction about the point (-1, 1). The equation of the line in its new position is:
 - (1) 7y x + 6 = 0

- (3) 7y + x 6 = 0
- (4) 7y + x + 6 = 0
- The diagonals of the parallelogram whose sides are lx + my + n = 0, lx + my + n' = 0, 38. mx + ly + n = 0, mx + ly + n' = 0 include an angle:
 - (1) $\frac{\pi}{6}$ (2) $\frac{\pi}{3}$ (3)

- $\frac{\pi}{2} = \frac{\pi}{2} = \frac{\pi}$
- If an equilateral triangle has one side given by x + y 2 = 0 and its centroid is at the origin, then one vertex of the triangle is: In the quadratic equation as 1 for 2 f - 0, if A = 6 - 4 or and a +
- (2) (-2,2)
- (3)(2,-2)

- (4) (-1, -1)
- If each of the points $(x_1, 4)$, $(-2, y_1)$ lies on the line joining the points (2, -1), (5, -3), then the point $P(x_1, y_1)$ lies on the line:
 - (1) 2x + 6y + 1 = 0

(2) 2x + 3y - 6 = 0

- (3) 6(x+y)-23=0
- (4) 6(x+y) 25 = 0
- If $|\vec{a}|=3$, $|\vec{b}|=4$ and $|\vec{a}+\vec{b}|=5$, then $|\vec{a}-\vec{b}|$ is equal to:
 - (1) 5

(2) 4

(3) 2

acad 10 5000 (8) (4) 1

42. If $(\vec{a} \times \vec{b})^2 + (\vec{a} \cdot \vec{b})^2 = 144$ and $|\vec{a}| = 4$, then $|\vec{b}|$ is equal to:

(1) 4

(2) 3

- (3) 1
- (4) 2

43. Let $|\vec{a}| = 1$, $|\vec{b}| = 2$, $|\vec{c}| = 3$ and $\vec{a} \perp (\vec{b} + \vec{c})$, $\vec{b} \perp (\vec{c} + \vec{a})$, $\vec{c} \perp (\vec{a} + \vec{b})$. Then $|\vec{a} + \vec{b} + \vec{c}|$ is:

 $(1) \sqrt{10}$

 $\sqrt{12}$ $\sqrt{12$

 $(3) \sqrt{8}$

 $(4) \sqrt{14}$

44. Let $\vec{a}, \vec{b}, \vec{c}$ be three vectors such that $\vec{a} \neq 0$ and $\vec{a} \times \vec{b} = 2 \vec{a} \times \vec{c}, |\vec{a}| = |\vec{c}| = 1, |\vec{b}| = 4$ and $|\vec{b} \times \vec{c}| = \sqrt{15}$. If $\vec{b} - 2\vec{c} = \lambda \vec{a}$, then λ is equal to: 50. H 202 - 125 | Re + 276 | B. (where | e -

- (1) 1
- (2) 3

The point on the line $\frac{x-2}{1} = \frac{y+3}{-2} = \frac{z+5}{-2}$ at a distance of 6 from the point (2, -3, -5)

(3) (3, -5, -3)

(2) (4, 7, 9) (4) (-3, 5, 3)

46. The coordinates of the centroid of the triangle ABC, where A, B, C are the points of intersection of the plane 6x + 3y - 2z = 18 with the coordinate axes are:

(1) (-1, 2, 3)

(3) (-1, -2, -3)

(4) (1, -2, 3)

47. The points (8, -5, 6), (11, 1, 8), (9, 4, 2) and (6, -2, 0) are the vertices of a:

(1) Rhombus

- (2) Rectangle
- (3) Parallelogram
- (4) Square

(1)
$$m = -1$$
, $n = 3$

(2)
$$m = -1, n = -3$$

D

(3)
$$m = 1, n = 3$$

(4)
$$m=1, n=-3$$

If $z = (\lambda + 3) + i\sqrt{(5 - \lambda^2)}$; then the locus of z is:

- (1) a Straight line
- (2) a Parabola

- (3) a Circle (4) a Hyperbola

If $8iz^3 + 12z^2 - 18z + 27i = 0$, (where $i = \sqrt{-1}$), then:

(1)
$$|z| = \frac{3}{2}$$

(2)
$$|z| = \frac{2}{3}$$

(3)
$$|z| = 1$$

(4)
$$|z| = \frac{3}{4}$$

51. The value of 'a' for which $ax^2 + \sin^{-1}(x^2 - 2x + 2) + \cos^{-1}(x^2 - 2x + 2) = 0$ has a real solution, is:

$$(1) \frac{2}{\pi}$$

The extended at the second
$$\frac{2}{\pi}$$
 in the second to reduce the second second

$$(3) \ \frac{\pi}{2}$$

(3)
$$\frac{\pi}{2}$$
 (4) $-\frac{\pi}{2}$

52. If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = 3\pi$, then xy + yz + zx is equal to :

(1) 0

(2) -3

(3) 3

- (4) -1

- **53.** The value of tan $\left\{ \left(\cos^{-1} \left(-\frac{2}{7} \right) \frac{\pi}{2} \right) \right\}$ is:
 - (1) $\frac{2}{3\sqrt{5}}$

(2) $\frac{2}{\sqrt{3}}$

- (3) $\frac{3}{\sqrt{5}}$
- (4) $\frac{4}{\sqrt{5}}$
- **54.** The least value of 'a' for which $\frac{4}{\sin x} + \frac{1}{1 \sin x} = a$ has at least one solution in the interval $\left(0,\frac{\pi}{2}\right)$ is:
 - (1) 8

(2) 9

(3) 4

- A spherical baloon is pumped at the rate of 10 inch³/min. If radius of baloon is 15 inch, then the rate of increase of its radius is:
 - (1) $\frac{1}{30\pi}$ inch/min

(2) $\frac{1}{120\pi}$ inch/min

(3) $\frac{1}{60\pi}$ inch/min

- (4) $\frac{1}{90\pi}$ inch/min
- The order of the differential equation whose general solution is given by:

 $y = (c_1 + c_2)\cos(x + c_3) - c_4$. $e^{x + c_5}$, where c_1 , c_2 , c_3 , c_4 and c_5 are arbitrary constant, is:

(1) 5

(3) 3

(4) (4) 2

D

(1) $\frac{3}{2}$

58. The differential equation representing the family of the curves $y^2 = 2c(x + \sqrt{c})$, where c is a positive parameter, is of:

(1) order 2, degree 2

(2) order 1, degree 3

- (3) order 3, degree 1
- (4) None of these

The solution of the differential equation $\sin y \frac{dy}{dx} = \cos y(1 - x \cos y)$ is: A approval follows is pumped at the rate of 10 Inch Jmin. If radius of baloon is 15

- (1) $\sec y = x 1 ce^{x}$
- (2) $\sec y = x + e^x + c$
- (3) $\sec y = x 1 + ce^x$
- (4) $\sec y = x + 1 + ce^{x}$

60. $\int \frac{3 + 2\cos x}{(2 + 3\cos x)^2} dx$ is equal to :

- $(1) \left(\frac{2\cos x}{2+3\sin x}\right) + c \qquad (2) \left(\frac{2\cos x}{2+3\cos x}\right) + c$
 - (3) $\left(\frac{\sin x}{2+3\cos x}\right)+c$ (4) $\left(\frac{\sin x}{3+2\cos x}\right)+c$

- **61.** If n is a positive integer but not a multiple of 3 and $z = -1 + i\sqrt{3}$, (where $i = \sqrt{-1}$), then $(z^{2n} + 2^n, z^n + 2^{2n})$ is equal to:
 - (1) -1

D

(2) 1

 $(3) 2^{n}$

- 57. The minister of numbers less than 1000 that can be incored out at the days The value of α for which the equation $(\alpha + 5) x^2 - (2\alpha + 1)x + (\alpha - 1) = 0$ has roots equal in magnitude but opposite in sign, is:
 - (1) -5
- $\frac{1}{2}$
- The manher of six digit numbers that can be (instited from the digits 1, 2, 2, 4, 5, 6 and (3) $\frac{7}{4}$
 - as instruction aligner built and the translations are the restrict at (4) 1
- **63.** Let α , β be the roots of the equation (x-a)(x-b)=c, $c\neq 0$. Then the roots of the equation $(x - \alpha)(x - \beta) + c = 0$ are:
 - (1) a, c

(2) b, c

(3) a, b

- (4) a + c, b + c
- If α , β are the roots of the equation $x^2 + x\sqrt{\alpha} + \beta = 0$, then the values of α and β are:
 - (1) $\alpha = 1, \beta = -2$

(2) $\alpha = 1$, $\beta = -1$

- (3) $\alpha = 2$, $\beta = 1$
- (4) $\alpha = 2$, $\beta = -2$
- 65. The number of diagonals that can be drawn in an octagon is:
 - (1) 16
- Reduce of the largest circle which moses through the force of the pr (2) 18
- (3) 28

(4) 20

(3) 8

66.	If n is an integer between 0 and 21, then	the minimum value of $\lfloor \underline{n} \cdot \lfloor 21 - \underline{n} \rfloor$ is:	100		
	(1) <u>[20</u>	(2) 10 - 11	71 3		
	(3) <u>[21</u>	(4) $\frac{11}{10}$			
67.	and 5, no digit being repeated is:	that can be formed out of the digits 0, 1,	2, 4		
	(1) 69	(2) 130			
	(3) 68	(4) None of these			
68.	The number of six digit numbers that can be formed from the digits 1, 2, 3, 4, 5, 6 and 7, so that digits don't repeat and the terminal digits are even is:				
	(1) 720	(2) 72			
		(4) 144			
69.		sion of $(x + a)^{100} + (x - a)^{100}$ after simplification	ation		
	(1) 50	(2) 51			
	(3) 150	(4) 102			
70.	For a positive integer n , if the expansion then a possible value for n is:	ion of $(2x^{-1} + x^2)^n$ has a term independent	of x		
	(1) 22	(2) 16			
	(3) 10	(4) 18			
71.		es through the focus of the parabola $y^2 = 4x$			
	(1) 2	(2) 4			

(4) 5

- The distances from the foci of P(a, b) on the ellipse $\frac{x^2}{9} + \frac{y^2}{25} = 1$ are:
 - (1) $4 \pm \frac{5}{4}b$

(2) $5 \pm \frac{4}{5}a$

(3) $5 \pm \frac{4}{5}b$

- (4) None of these
- Two conics $\frac{x^2}{a^2} \frac{y^2}{b^2} = 1$ and $x^2 = -\frac{a}{b}y$ intersect, if:
 - (1) $a^2 < \frac{1}{4}$
- $\frac{1-\pi}{2} = \frac{\pi}{4} = \frac{\pi}{4}$ (2) $a^2 > \frac{1}{4}$
- (3) $a^2 = \frac{1}{4}$
- (4) None of these
- The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$, and having its centre (0, 3) is:
 - (1) 3

 $\frac{1}{5}\sqrt{5}$ from $\frac{1}{5}\sqrt{6}$ (2) $\sqrt{3}$ (4) 4

(3) 2

- The locus of the point, the sum of squares of whose distance, from the planes x z = 0, x - 2y + z = 0 and x + y + z = 0 is 36 is given by:
 - (1) $x^2 + y^2 + z^2 = 6$
- (2) $x^{-2} + y^{-2} + z^{-2} = \frac{1}{36}$
- (3) $x^2 + y^2 + z^2 = 36$

- (4) $x^2 + y^2 + z^2 = 216$
- **76.** The equation of the plane through the point (2, 5, -3) perpendicular to the planes x + 2y + 2z = 1 and x - 2y + 3z = 4 is:
 - $(1) \ 3x 4y + 2z = 20$
- (2) 10x y 4z = 27
- (3) 3x + 4y 2z = 20
- (4) 10x + y + 4z = 27
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- 77. A line makes angles α , β , γ , δ with the four diagonals of a cube. Then $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma + \cos^2 \delta$ is:
 - (1) $\frac{4}{3}$

 $\frac{1}{3}$ (2) $\frac{1}{3}$

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

- $(4) \frac{3}{4}$
- **78.** The symmetric form of the equations of the line x + y z = 1, 2x 3y + z = 2 is :
 - (1) $\frac{x}{2} = \frac{y}{3} = \frac{z}{5}$
- (2) $\frac{x}{2} = \frac{y}{3} = \frac{z-1}{5}$
- (3) $\frac{x}{3} = \frac{y}{2} = \frac{z}{5}$

- (4) $\frac{x-1}{2} = \frac{y}{3} = \frac{z}{5}$
- **79.** If $A = \cos(\cos x) + \sin(\cos x)$, the least and greatest value of A are:
 - (1) 0 and 2

(2) -1 and 1

(3) $-\sqrt{2}$ and $\sqrt{2}$

- (4) $\frac{1}{\sqrt{2}}$ and $\sqrt{2}$
- **80.** The least value of $\csc^2 x + 25 \sec^2 x$ is:
 - (1) 38

(2) 36

(3) 34

- (4) 32
- 81. If λ is a non-real cube root of -2, then the value of $\begin{vmatrix} 1 & 2\lambda & 1 \\ \lambda^2 & 1 & 3\lambda^2 \\ 2 & 2\lambda & 1 \end{vmatrix}$ is equal to:
 - (1) -10
- (2) -13
- (3) -11
- The selection (4) -12

82. If
$$z = \begin{vmatrix} 3+2i & 5-i & 7-3i \\ i & 2i & -3i \\ 3-2i & 5+i & 7+3i \end{vmatrix}$$
, where $i = \sqrt{-1}$, then z is:

(1) Purely Real

(2) Purely Imaginary

(3) 1

(4) 0

83. The value of the determinant
$$\begin{vmatrix} 1 & e^{i\pi/3} & e^{i\pi/4} \\ e^{-i\pi/3} & 1 & e^{2i\pi/3} \\ e^{-i\pi/4} & e^{-2i\pi/3} & 1 \end{vmatrix}$$
, where $i = \sqrt{-1}$ is:

(1) $2 + \sqrt{2}$

(2) $2 - \sqrt{3}$

(3) $2 + \sqrt{3}$

- $(4) -(2 + \sqrt{2})$
- **84.** If A is a skew-symmetric matrix, then trace of A is:
 - (1) -1

(2) 1

- (3) 0
- Charles and the second of the

85. If
$$A = \begin{bmatrix} \cos x & \sin x & 0 \\ -\sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix} = f(x)$$
, then A^{-1} is equal to:

(1) f(x)

- allowing f(-x)
- (3) -f(x)
- (4) 0

86. If
$$A^2 + A - I = 0$$
, then A^{-1} is equal to:

(1) A-I

(2) A+I

(3) I

(4) (4) 0

- 87. If x^y , $y^x = 16$, then $\frac{dy}{dx}$ at (2, 2) is:
 - (1) 0

(2) 1

(3) -1

- **88.** If $x^2 + y^2 = t \frac{1}{t}$ and $x^4 + y^4 = t^2 + \frac{1}{t^2}$, then $x^3 y \frac{dy}{dx}$ is equal to :
 - (1) 1

(3) 0

- $\frac{1}{2}$ (4) $\frac{1}{2}$
- **89.** If $y = \tan^{-1} \left[\frac{\log_e(e/x^2)}{\log_e(ex^2)} \right] + \tan^{-1} \left[\frac{3 + 2\log_e x}{1 6\log_e x} \right]$, then $\frac{d^2y}{dx^2}$ is:
 - (1) -1

(2) 1

(3) ∞

- (4) 0
- The locus of all points on the curve $y^2 = 4a \left[x + a \sin \left(\frac{x}{a} \right) \right]$ at which the tangent is parallel to x-axis is:
 - (1) Ellipse

(2) Hyperbola

(3) Parabola

- (4) Circle
- The range of the function $f(x) = 3|\sin x| 2|\cos x|$ is:
 - (1) $[-2, \sqrt{13}]$
- (2) [-2, 3]

(3) [-3, 2]

 $(4) [3, \sqrt{13}]$

- **92.** Let $f: R \to \left[0, \frac{\pi}{2}\right]$ be a function defined by $f(x) = \tan^{-1}(x^2 + x + a)$. If f is onto, then a equals:
 - (1) $\frac{1}{4}$

(3) 1

- If the domain of f(x) is (0, 1), then the domain of $f(e^x) + f(\ln |x|)$ is:
 - (1) (-1, e)

(3) (-e, 1)

- **94.** Let $f: R \to R$ be a function defined by $f(x) = \frac{x^2 + 2x + 5}{x^2 + x + 1}$. The function f(x) is :
 - (1) one-one and into
- (2) one-one and onto
- (3) many one and onto

- (4) many one and into
- The probability that at least one of the events A and B occurs is $\frac{3}{5}$. If A and B occur simultaneously with probability $\frac{1}{5}$, then $P(\overline{A}) + P(\overline{B})$ is:
 - $(1) \frac{2}{5}$
- (2) $\frac{4}{5}$ (3) $\frac{6}{5}$
- $(4) \frac{7}{5}$
- A bag contains 16 coins of which two are counterfeit with heads on both sides. The rest are fair coins. One is selected at random from the bag and tossed. The probability of getting a head is:
 - (1) $\frac{9}{16}$

(2) $\frac{11}{16}$

 $(3) \frac{13}{16}$

 $(4) \frac{15}{16}$

- An urn contains five balls. Two balls are drawn and are found to be white. The probability that all the balls are white is:

(2) $\frac{1}{2}$ (4) $\frac{1}{2}$

 $(3) \frac{3}{5}$

- 98. A box contains 6 nails and 10 nuts. Half of the nails and half of the nuts are rusted. If one item is chosen at random, the probability that it is rusted or is a nails is:
 - (1) $\frac{3}{16}$

 $(2) \frac{5}{16}$

- **99.** The maximum value of P = 6x + 8y subject to constraints $2x + y \le 30$, $x + 2y \le 24$, $x \ge 0, y \ge 0$ is:
 - (1) 90

(2)96

- 1. vi supris il bus A supris (4) 240
- The number of proper subsets of the set {1, 2, 3} is:
 - (1) 6

(4) 9

Answer	key for 5 Year Integ	grated M. Sc. (Hons.)	(Maths) for all Serie	s/Codes
Q. No.	A	В	С	D
1	2	1	4	4
2	1	4	2	2
3	4	3	3	1
4	3	1	1	1
5	2	2	4	3
6	2	4	2	4
7	3	3	3	2
8	1	2	1	3
9	4	1	2	1
10	3	4	4	2
11	4	1	4	2
12	2	3	3	4
13	1	2	1	3
14	1	4	2	1
15	3	1	4	2
16	4	2	3	4
17	2	3	1	3
18	3	4	2	1
19	1	1	4	3
20	2	1	3	1
21	4	3	2	1
22	3	1	1	4
23	1	2	4	3
24	2	4	3	1
25	4	3	2	2
26	3	1	2	4
27	1	2	3	3
	2	4	1	2
28				
29	3	3	3	4
30				
31	1	4	2	1
32	2	2	4	3
33	4	1	3	2
34	3	1	1	4
35	1	3	2	1
36	2	4	4	2
37	4	2	3	3
38	2	3	1	4
39	3	1	3	1
40	1	2	1	1
41	4	2	2	1
42	2	4	3	2
43	3	3	1	4
44	1	1	4	3
45	4	2	3	1
46	2	4	2	2
47	3	3	1	4
48	1	1	4	2
49	2	3	3	3

50	4	1	2	1
51	1	2	1	4
52	3	3	2	3
53	2	1	4	1
54	4	4	3	2
55	1	3	1	4
56	2	2	2	3
57	3	1	4	1
58	4	4	2	2
59	1	3	3	4
60	1	2	1	3
61	2	1	1	4
62	3	2	4	2
63	1	4	3	3
64	4	3	1	1
65	3	1	2	4
66	2	2	4	2
67	1	4	3	3
68	4	2	2	1
69	3	3	1	2
70	2	1	4	4
71	1	4	3	2
72	4	2	1	3
73	3	3	2	1
74	1	1	4	4
75	2	4	3	3
76	4	2	1	2
77	3	3	2	1
78	2	1	4	4
79	1	2	3	3
80	4	4	1	2
81	3	4	4	2
82	1	3	2	1
83	2	1	1	4
84	4	2	1	3
85	3	4	3	2
86	1	3	4	2
87	2	1	2	3
88	4	2	3	1
89	3	4	1	4
90	1	3	2	3
91	2	2	1	3
92	4	1	3	1
93	3	4	2	2
94	1	3	4	4
95	2	2	1	3
96	4	2	2	1
97	3	3	3	2
98	1	1	4	4
99	3	4	1	3
100	1	3	1	1
			•	