STUDY CHMPUS AN ISO 9001 : 2015 CERTIFIED INSTITUTE

No of Questions: 120

1. A relation R is defined on the set Z of integers as follows:

 $\mathbf{mRn} \Leftrightarrow m + nisodd.$

Which of the following statements is/are true for R?

- 1. R is reflexive 2. R is symmetric
- 3. R is transitive

Select the correct answer using the code given below:

- a) 2 only b) 2 and 3
- c) 1 and 2 d) 1 and 3
- 2. The maximum three digit integer in the decimal system will be represented in the binary system by which one of the following?
 - a) 1111110001
 - b) 11111110001
 - c) 111111110
 - d) 111100111
- 3. Let f: $[-100 \ \pi$, $100 \ \pi$] \rightarrow [-1,1] be defined by f(θ) = sin θ . Then what is the number of values of $\theta \in [-100 \ \pi$, $1000 \ \pi$] for which f(θ) = 0?
 - a) 1000 b) 1101
 - c) 1100 d) 1110
- 4. What does the shaded region in the Venn diagram given below represent ?



- a) $C \cap (A \cap B)$
- b) $C \cup (C \cap A \cap B)$
- c) $C \cup (C \cap A) \cup (C \cap B)$
- d) $C \cup (A/B)$
- 5. The difference of two numbers 10001100 and 1101101 in binary system is expressed in decimal system by which one of the following?
 a) 27 b) 29

c)	31			d)	33			
If A	and B	are	subsets	of a	set X,	then	what	is

- $\begin{array}{ll} \{A \cap (X B)\} \cup B \text{ equal to ?} \\ \text{a)} & A \cup B & \text{b)} & A \cap B \\ \text{c)} & A & \text{d} & B \end{array}$
- 7. The number 0.0011 in binary system represents

 a) rational number 3/8 in decimal system
 b) rational number 1/8 in decimal system
 c) rational number 3/16 in decimal system
 - d) rational number 5/16 in decimal system
- 8. If $A = P(\{1,2\})$ where P denotes the power set, then which of the following is correct?

- Time: 2 ½ hours
- a) $\{1,2\} \subset A$ b) b) $1 \in A$
- c) $\phi \notin A$ d) $\{1,2\} \in A$
- 9. If $A = \{1, 2, 5, 6\}$ and $B = \{1, 2, 3\}$ then what is $(A \times B) \cap (B \times A)$ equal to?
 - a) {(1, 1), (2, 1), (6, 1), (3, 2)}
 - b) $\{(1, 1), (1, 2), (2, 1), (2, 2)\}$
 - c) $\{(1, 1), (2, 2)\}$
 - d) $\{(1, 1), (1, 2), (2, 5), (2, 6)\}$
- 10. Out of 500 first year students, 260 passed in the first semester and 210 passed in the second semester. If 170 did not pass in either semester, how many passed in both semesters?
 - a) 30 b) 40
 - c) 70 d) 140
- **11.** Let $A = \{x \in W, \text{ the set of whole numbers and } x < 3\}$
 - **B** = { $x \in N$, the set of natural numbers and $2 \le x < 4$ }

and
$$C = \{3, 4\}$$
, then how many elements will

 $(A \cup B) \times C$ contain?

a)	6	b)	8
c)	10	d)	12

12. If $\sin \theta$ and $\cos \theta$ are roots of $ax^2 + bx + c = 0$, then constants a, b, c will satisfy which one of the following conditions?

a)
$$a^2 + b^2 + 2ac = 0$$

b)
$$a^2 + b^2 - 2ac = 0$$

c)
$$a^2 - b^2 + 2ac = 0$$

d)
$$-a^2 + b^2 + 2ac = 0$$

13. How many real values of x satisfy the equation |x|+|x-1| = 1?

14. What is the value of $\sqrt{5\sqrt{5\sqrt{5\sqrt{\dots\infty}}}}$?

a) 5 b)
$$\sqrt{5}$$

c) 1 d) $(5)^{1/4}$

15. If (x+a) is a factor of both the quadratic polynomials x² +px+q and x² +lx+m where p,q, and m are constants, then which 1 of the following is correct ?

a)
$$a = (m-q)/(l-p)(l \neq p)$$

b)
$$a = (m+q)/(l+p)(l \neq -p)$$

c)
$$l = (m-q)/(a-p)(a \neq p)$$

d)
$$p = (m-q)/(a-l)(a \neq l)$$

16. Consider the equation (x-p)(x-6)+1=0having integral coefficients. If the equation has integral roots, then what values can p have?

6.

- b) 5 or 10 a) 4 or 8 6 or 12 d) c) 3 or 6
- 17. If p, q and r are rational numbers, then the roots of the equation $x^2 - 2px + p^2 - q^2 + 2qr - r^2 = 0$ are
 - b) pure imaginary a) complex
 - d) rational c) irrational
- **18.** If the roots of the equation $x^2 4x \log_3 N = 0$ are real, then what is the minimum value of N? 1/256 b) 1/27a)
 - 1/64 c) d) 1/81
- 19. A bag contains balls of tow colors, 3 black and 3 whitej. What is the smallest number of balls which must be drawn from the bag, without looking, so that among these three are two of the same colour?
 - b) 3 a) 2 c) 4 d) 5
- 20. If pth term of an AP is q, and its qthterm is p, then what is the common difference?
 - 1 b) Λ a) 2 1
- c) d) 21. If the points with the coordinates (a, ma), {b, (m +1) b}, {c, (m + 2) c} are collinear, then which one of the following is correct?
 - a, b, c are in arithmetic progression for all m a)
 - a, b, c are in geometric progression for all m b)
 - a, b, c are in harmonic progression for all m c)
 - d) a, b, c are in arithmetic progression only for m = 1
- 22. If a, 2a + 2, 3a + 3 are in GP, then what is the fourth term of the GP?

a)	- 13.5	b)	13.5
c)	-27	d)	27

23. Let a, b, c be in AP. Consider the following statements:

1.
$$\frac{1}{ab}, \frac{1}{ca}$$
 and $\frac{1}{bc}$ are in AP.
2. $\frac{1}{\sqrt{b} + \sqrt{c}}, \frac{1}{\sqrt{c + \sqrt{a}}}$ and $\frac{1}{\sqrt{a} + \sqrt{b}}$ are in AP

Which of the statements given above is/are correct?

- a) 1 only b) 2 only
- Both 1 and 2 d) Neither 1 nor 2 c)
- 24. If log10 2, log10 (2^x 1), log10 (2^x+ 3) are three consecutive terms of an AP, then which one of the following is correct?
 - a) x = 0b) x = 1 d) $x = \log 52$ $x = \log 25$ c)
- 25. The sum of first 10 terms and 20 terms of an AP are 120 and 440 respectively. What is the common difference?
 - 2 1 b) a) 3 c) d) 4
- 26. Which one of the following is correct? If z and w are complex number a \overline{w} denotes the conjugate of w, then |z + w| - |z - w| holds only, if

a)
$$z = 0$$
 or $w = 0$ b) $z = 0$ and $w = 0$

- z. \overline{w} is purely real c)
- d)
- 27. What is the value of $\left(\frac{i+\sqrt{3}}{-i+\sqrt{3}}\right)^{200} + \left(\frac{i+\sqrt{3}}{i+\sqrt{3}}\right)^{200}$ +1?-1 b) a) 1 c) d) 2 28 If $z=1+i\tan\alpha$ where $\pi < \alpha < \frac{3\pi}{2}$, then what is $|\mathbf{z}|$ equal to? a) $\sec \alpha$ b) -sec α sec2 α d) - sec2 α c) 29. For any positive integer n, if 4n – 3n is divided by 9, then what is the remainder? 8 a) b) 6 4 d) c) 1
- 30. What is the number of terms in the expansion of $(a + b + c)^n$, $n \in N$?

a)
$$n+1$$
 b) $n+2$
c) $n(n+1)$ d) $\frac{(n+1)(n+2)}{2}$

31. In how many ways can be letters of the word 'CABLE' be arranged so that the vowels should always occupy odd positions?

32. In a football championship 153 matches were played. Every team played one match with each other team. How many teams participated in the championship?

33. What is the value of $\sum_{r=1}^{n} \frac{P(n,r)}{r!}$?

a)
$$2^{n} - 1$$
 b) 2^{n}
c) $2^{n} - 1$ d) $2^{n} + 1$

- c) $2^{n}-1$ d) $2^{n}+1$ 34. The straight line ax + by + c = 0 and the coordinate axes form an isosceles triangle under which one of the following conditions?
 - |a| = |b|a) b) |a| = |c|
 - c) |b| = |c|d) none of these
- 35. The middle point of the segment of the straight line joining the points (p, q) and (q, -p) is (r/2, p)s/2). What is the length of the segment? /2]/4

a)
$$[(s^2 + r^2)^{1/2}]/2$$
 b) $[(s^2 + r^2)^{1/2}]/2$

c)
$$(s^2 + r^2)^{1/2}$$
 d) $s + 1$

36. What is the locus of the point which is at a distance 8 units to the left of Y-axis? v _ 0 2)

a)
$$X = 8$$
 b) $Y = 8$
c) $X = -8$ d) $Y = -8$

- d) Y = -8X = - 8 C)
- 37. The line making an angle (- 120°) with x-axis is situated in the:
 - first quadrant b) second quadrant a)
 - c) third quadrant d) fourth quadrant
- 38. Two straight line paths are represented by the equation 2x - y = 2 and -4x + 2y = 6. Then the paths will
 - a) cross each other at one point

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- b) not cross each other
- c) cross each other at two points
- d) cross each other at infinitely many points
- 39. What is the equation of circle which touches the lines x = 0, y = 0 and x = 2?
 - $x^2 + y^2 + 2x + 2y + 1 = 0$ a)
 - $x^2 + y^2 4x 4y + 1 = 0$ b)
 - $x^2 + y^2 2x 2y + 1 = 0$ c)
 - None of these d)
- 40. P (2, 2) is a point on the parabola y2 = 2x and A is its vertex. Q is another point on the parabola such that PQ is perpendicular to AP. What is the length of PQ?
 - $\sqrt{2}$ $2\sqrt{2}$ a) b) 4√2 c) d) 6√2
- 41. If (4,0) and (-4,0) are the foci of an ellipse and the semimnor axis is 3, then the ellipse passes through which one of the following points?
 - a) (2,0)b) (0,5)
 - (0,0)c) d) (5,0)
- 42. The equation of the ellipse whose vertices are (± 5, 0) and foci at (± 4, 0) is

a)
$$\frac{x^2}{25} + \frac{y^2}{9} = 1$$
 b) $\frac{x^2}{9} + \frac{y^2}{25} = 1$
c) $\frac{x^2}{16} + \frac{y^2}{25} = 1$ d) $\frac{x^2}{25} + \frac{y^2}{16} = 1$

- 43. Given that $p = \tan \alpha + \tan \beta$, and $q = \cot \alpha + \cot \beta$; then what is (1/p - 1/q) equal to? b) $tan (\alpha - \beta)$ $\cot(\alpha - \beta)$ a) $\tan(\alpha + \beta)$ c) d) $\cot(\alpha + \beta)$
- 44. Let ABCD be a square and let P be a point on AB such that AP: PB = 1:2. If \angle APD = θ , then what is the value of $\cos \theta$?

a) 1/√10 b) 1/√5

- 2/√10 $2/\sqrt{5}$ d) c)
- 45. What is the correct sequence of the following values?

1.
$$\sin\left(\frac{\pi}{12}\right)$$
 2. $\cos\left(\frac{\pi}{12}\right)$
3. $\cot\left(\frac{\pi}{12}\right)$

What is the correct sequence of the following values?

a)
$$3 > 2 > 1$$

b) $1 > 2 > 3$
c) $1 > 3 > 2$
d) $3 > 1 > 2$

- 46. If $\sin^4 x \cos^4 x = p$, then which one of the following is correct?
 - p = 1 p = 0 a) b)
 - |p|>1 d) |p|≤1 C)
- 47. What is the value of $\cos(\pi/9) + \cos(\pi/3) + \cos(\pi/3)$ $(5\pi/9) + \cos(7\pi/9)?$
 - a) 1 b) -1 1/2 c)
 - -1/2d)
- 48. If $y = \sec^2 \theta + \cos^2 \theta$, where $0 < \theta < \pi/2$, then which one of the following is correct?
 - y = 0 a) b) $0 \le y \le 2$
 - d) $v \ge 2$ None of these c)
- 49. What is the maximum value of 3 cos x + 4 sin x + 5?

- 7 a) 5 b) 10 12 c) d)
- 50. What is the value of sin (1920°)? $1/\sqrt{2}$ a) 1/2b) $\sqrt{3/2}$ c) d) 1/3
- 51. If $\csc \theta + \cot \theta = c$, then what is $\cos \theta$ equal to?

a)
$$\frac{c}{c^2 - 1}$$
 b)
b) $\frac{c^2 - 1}{c^2 - 1}$ d)

)
$$\frac{c^2-1}{c^2+1}$$
 d) None of these

- 52. If the perimeter of a triangle ABC is 30 cm, then what is the value of $a \cos^2(C/2) + c \cos^2(A/2)$? a) 15 cm b) 10 cm
 - $15/2 \, \text{cm}$ d) 13 cm c)
- 53. Let $-1 \le x \le 1$. If cos (sin-1 x) = 1/2, then how many value does tan (cos-1 x) assume? a) One h) Two

54. If angles A, B and C are in AP, then what is sin A + 2 sin B + sin C equal to?

a)
$$4\sin \mathbf{B}\cos^2\left(\frac{A-C}{2}\right)$$

b) $4\sin B\cos^2\left(\frac{A-C}{4}\right)$

c)
$$4\sin(2B)\cos^2\left(\frac{A-C}{2}\right)$$

d) $4\sin(2B)\cos^2\left(\frac{A-C}{4}\right)$

55. If the sides of a triangle are in the ratio 2: $\sqrt{6}$: 1 + $\sqrt{3}$, then what is the smallest angle of the triangle?

a)
$$75^{\circ}$$
 b) 60°
c) 45° d) 30°

56. PT, a tower of height 2x metre, P being the foot, T being the top of the tower. A, B are points on the same line with P. If $AP = 2^{x+1} m$, BP = 192 m and if the angle of elevation of the tower as seen from b is double the angle of the elevation of the tower as seen from A, then what is the value of x? a) 6 b) 7

- 57. The angle of elevation of a tower at a level ground is 30°. The angle of elevation becomes θ when 10 m moved towards the tower. If the height of tower is $5\sqrt{3}$ m, then what is θ equal to?
 - a) 45° b) 60°
 - 75° c) d) None of the above
- 58. If $f(x) = (1 + x)^{5/x}$ is continuous at x = 0, then what is the value of f (0)?

 ∞ d) C) 59. A function f is defined as follows

$$f(x) = x^{p} \cos\left(\frac{1}{x}\right), x \neq 0$$

$$f(0)=0$$

What conditions should be imposed on p so that f may be continuous at x = 0?

	a)	p = 0	b)	p > 0
	c)	p < 0	d)	No value of p
60.	What	t is the value of $\lim_{x\to a}$	$\frac{1}{\alpha} \frac{\sqrt{\alpha}}{\sqrt{3\alpha}}$	$\frac{1}{x+x} - \left(\frac{\sqrt{3}x}{2\sqrt{x}}\right)?$
	a)	2√3	b)	1/(3√3)
	c)	2/(3√3)	d)	1/√3
61.	What	is the value of $\lim_{x\to 1}$	$\frac{(x-1)}{ x-x }$	$\frac{)^2}{1}$?
	a)	0		
	b)	1		
	c)	-1		
	d)	The limit does not e	exist	
62.	What	t is $\lim_{x\to\infty} \left(\sqrt{a^2x^2 + ax}\right)$	x + 1 -	$-\sqrt{a^2x^2+1}$) equal to
	?			
	a)	1/2	b)	1
	c)	2	d)	0
63.	Let A	$= \{x \in R \mid x \ge 0\}$. A fu	nction f: $A \rightarrow \in A$ is

- ≻∈A is defined by $f(x) = x^2$. Which one of the following is correct?
 - a) The function does not have inverse b) f is its own inverse
 - The function has an inverse but f is not its own c) Inverse
 - None of the above d)
- 64. What is the probability of having a knave and a queen when two cards are drawn from a pack of 52 cards?

a)	16/663	b)	2/663
c)	4/663	d)	8/663

65. Give
$$P(A \cup B) = \frac{5}{6}, P(A \cap B) = \frac{1}{3} \text{ and } P(\overline{B}) =$$

What is P(A)?

i)	1/6	b)	1/3
:)	2/3	d)	1⁄2

66. The outcomes of 5 tosses of a coin are recorded in a single sequence as H (head) and T (tail) for each toss. What is the number of elementary events in the sample space?

a)	5	b)	10
c)	25	d)	32

67. For a binomial distribution B(n, p), np = 4 and variance npq = 4/3. What is the probability $P(x \ge x)$ 5) equal to?

a)	$(2/3)^{6}$	b)	$(1/3)^{6}$
c)	$(1/3)^{6}$	d)	$(2^8/3^6)$

- 68. The probability of guessing a correct answer is X/12. If the probability of not guessing the correct answer is 2/3, then what is x equal to? 2 b) 3 a)
 - 4 d) 6 c)
- 69. In a random arrangement of the letters of the word 'UNIVERSITY', what is the probability that two I's do not come together?

a)	4/5	b)	1/5
c)	1/10	d)	9/10

70. Consider a random experiment of throwing together a die and two coins. The associated

1

 $\overline{2}$

sample space has

- a) 8 points b) 12 points c)
- 24 points d) 36 points
- 71. What is the length of the perpendicular from the origin to the plane $ax + by + \sqrt{2abz} = 1$?
 - a) 1/(ab)b) 1/(a + b)
 - a + b c) d) ab
- 72. What are the direction cosines of the line represented by 3x + y + 2z = 7, x + 2y + 3z = 5?

a)
$$(-1,-7,5)$$

b) $(-1,7,5)$
c) $\left(-\frac{1}{\sqrt{75}},-\frac{7}{\sqrt{75}},\frac{5}{\sqrt{75}}\right)$
d) $\left(-\frac{1}{\sqrt{75}},-\frac{7}{\sqrt{75}},\frac{5}{\sqrt{75}}\right)$

- $\sqrt{75}\sqrt{75}\sqrt{75}$ 73. Curve of intersection of two spheres is a) an ellipse b) a circle
 - c) a parabola d) None of these
- 74. DIRECTIONS: The vertices of a cube are (0, 0, 0), (2, 0, 0), (0, 2, 0), (0, 0, 2), (2, 2, 0), (2, 0, 2),(0, 2, 2), (2, 2, 2) respectively.

What is the angle between any two diagonals of the cube?

a)
$$\cos^{-1}(1/2)$$
 b) $\cos^{-1}(1/3)$
c) $\cos^{-1}(1/2)$ d) $\cos^{-1}(1/3)$

- c) $\cos^{-1}(2/\sqrt{3})$ $\cos^{-1}(1/\sqrt{3})$ d)
- 75. The equation to sphere passing through origin and the points (-1, 0, 0), (0, -2, 0) and (0, 0, -3) is $x^{2} + y^{2} + z^{2} + f(x, y, z) = 0$. What is f(x, y, z) equal to? - x - 2y - 3z b) x + 2y + 3za) + 1

c)
$$x + 2y + 3z - 1$$
 d) $x + 2y + 3z$

- 76. What is the distance between the planes
 - x 2y + z 1 = 0 and -3x + 6y 3z + 2 = 0? 2

- d) 77. The definition of Mode fails if:
 - a) the maximum frequency is repeated
 - b) the maximum frequency is not repeated
 - the maximum frequency occurs in the middle c)
 - the curve drawn with the help of given data is d) **Symmetrical**
- 78. Consider the following statements: The appropriate number of classes while constructing a frequency distribution should be chosen such that
 - 1. the class-frequency first increases to a peak and then declines.
 - 2. the class-frequency should cluster around the class mid point.
 - Which of the statements given is/are correct?
 - 1 only a) b) 2 only
 - Both 1 and 2 d) Neither 1 nor 2 c)
- 79. In a factory, there are 30 men and 20 women employees. If the average salary of men is Rs 4050 and the average salary of all the employees is Rs 3550, then what is the average salary of women?
 - a) Rs 3800 b) Rs 3300 c) Rs 3000 d) Rs 2800
- 80. The two lines of regression are 8x 10y = 66 and 40x - 18y = 214 and variance of x series is 9. What is the standard deviation of y series?

a)	3	b)
c)	6	d)

c) 6
d) 8
81. Students of three sections of a class, having 30, 30 and 40 students appeared for a test of 100 marks. The arithmetic means of the marks of the three sections are 72.2, 69.0 and 64.1 in that order. What is the arithmetic mean of the marks of all the students of the three sections?

4

a)	66.6	b)	67.3
c)	68.0	d)	70.6

82.

DIRECTIONS- Note: Study the pie chart given below and answer the questions that follow :

The following pie chart gives the distribution of funds in a five year plan under the major heads of development expenditures: Agriculture(A), Industry (B), Education (C), Employment (D) and Miscellaneous (E)

The total allocation is 36,000 (in crores of rupees).



- <u>Q.</u> How much money (in crores) is allocated to both Agriculture and Employment?
- a) 20000 b) 21000
- c) 24000 d) 27000
- 83. If the mean of few observations is 40 and standard deviation is 8, then what is the coefficient of variation?

c)	20%		d)	30%	
* • **		-	 		

84. What is the derivative of f(x) = x |x|?

a)	x + x	b)	2x
c)	2 x	d)	- 2 x

85. For the curve $\sqrt{x} + \sqrt{y} = 1$, what is the value of

1

2

$$\frac{dy}{dx} \operatorname{at} \left(\frac{1}{4}, \frac{1}{4}\right)?$$
a) $\frac{1}{2}$ b) c) -1 d)

86. If
$$y = \sin^{-1}\left(\frac{4x}{1+4x^2}\right)$$
, then what is $\frac{dy}{dx}$ equal to ?

a)
$$\frac{1}{1+4x^2}$$
 b) $-\frac{1}{1+4x^2}$
c) $\frac{4}{1+4x^2}$ d) $\frac{4x}{1+4x^2}$

87. Consider the following statements;

1. If
$$y = ln(\sec x + \tan x)$$
, then $\frac{dy}{dx} = \sec x$.
2. $y = ln(\cos ecx - \cot x)$, then $\frac{dy}{dx} = \cos ecx$.

2.
$$y = m(\cos e cx - \cot x)$$
, then $\frac{1}{dx} = \cos e c$
Which of the above is/are correct?

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- 1 only b) 2 only
- Both 1 and 2 d) Neither 1 nor 2
- 88. What is the minimum value of px + qy (p > 0, q > 0) when xy = r²?
 - a) $2r\sqrt{pq}$ b) $2pq\sqrt{r}$
 - c) $-2r\sqrt{pq}$ d) 2rpq
- 89. What is the maximum value of the function log x x?

0

a) -1 b)

a)

c)

- c) 1 d) ∞
- 90. A balloon is pumped at the rate of 4cm3 per second. What is the rate at which its surface area increases and radius is 4 cm?
 - a) $1 \text{ cm}^2/\text{s}$? b) $2 \text{ cm}^2/\text{s}$
 - c) $3 \text{ cm}^2/\text{s}$ d) $4 \text{ cm}^2/\text{s}$
- 91. If the rate of change in volume of spherical soap bubble is uniform, then the rate of change of surface area varies as
 - a) square of radius
 - b) square root of radius
 - c) inversely proportional to radius
 - d) cube of the radius
- 92. What is the value of $\int \frac{dx}{(x^2 + a^2)(x^2 + b^2)}?$

a)
$$\int \frac{\left[\left\{ \tan^{-1}(x/a) \right\} / a - \left\{ \tan^{-1}(x/b) \right\} / b \right]}{\left(a^2 + b^2 \right)} + c$$

b)
$$\int \frac{\left\lfloor \left\{ \tan^{1}(x/a) \right\} / a + \left\{ \tan^{1}(x/b) \right\} / b \right\rfloor}{\left(a^{2} + b^{2} \right)} + c$$

c)
$$\int \frac{\left[\left\{\tan^{1}(x/a)\right\}/a + \left\{\tan^{1}(x/b)\right\}/b\right]}{\left(b^{2} - a^{2}\right)} + c$$

d)
$$\int \frac{\left[\left\{\tan^{-1}(x/a)\right\}/a + \left\{\tan^{-1}(x/b)\right\}/b\right]}{\left(b^2 - a^2\right)} + c$$

93 If $\int x^2 \ln x dx = \frac{x^3}{m} \ln x + \frac{x^3}{n} + c$, then what are the

values of m and n respectively? a) 1/3.-1/9 b) 3.-9

- 94. Question not available
 - a) $\ell n(\ell nx) + c$

b)
$$\ell nx + c$$

- c) $(\ln x)^2 + c$
- d) None of the above
- **95.** What is the area of the ellipse $4x^2 + 9y^2 = 1$

a)
$$6\pi$$
 b) $\frac{\pi}{36}$
c) $\frac{\pi}{6}$ d) $\frac{\pi}{\sqrt{6}}$

96. What is the value of the integral $\int_{-1}^{1} |x| dx$?

a) 1 b) 0 c) 2 d) -1 97. What is the area of the portion of the curve y = sin x, lying between x = 0, y = 0 and x = 2π ? a) 1 square unit b) 2 square units 4 square units d) 8 square units c) 98. What is the solution of the differential equation $\frac{dy}{dx} = \sec(x+y)?$ y + tan (x+y) = ca) b) $y - \tan\left\{\frac{(x+y)}{2}\right\} = c$

c)
$$y + \tan\left\{\frac{(x+y)}{2}\right\} = c$$

d) $y + \tan\left\{\frac{(x-y)}{2}\right\} = c$

- 99. What does the solution of the differential equation x dy - y dx = 0 represent?
 - a) Rectangular hyperbola
 - b) Straight line passing through the origin
 - Parabola whose vertex is at origin c)
 - d) Circle whose centre is at origin
- 100. Which one of the following is the differential equation to family of circles having centre at the origin?

a)
$$(x^2 - y^2)\frac{dy}{dx} = 2xy$$

b) $(x^2 + y^2)\frac{dy}{dx} = 2xy$

c)
$$\frac{dy}{dx} = (x^2 + y^2)$$

d) $xdx + ydy = 0$

101. The differential equation representing the family of curves $y = a \sin(\lambda x + \alpha)$ is:

a)
$$\frac{d^2 y}{dx^2} + \lambda^2 y = 0$$

b)
$$\frac{d^2 y}{dx^2} - \lambda^1 y = 0$$

c)
$$\frac{d^2 y}{dx^2} + \lambda y = 0$$

- d) none of these
- 102. If a matrix B is obtained from a square matrix A by interchanging any two of its rows, then what is | A + B| equal to

10		quan .						
a)	2 A				b)	2 B		
c)	0				d)	A - .	B	
103. If	A is	any	2	х	2	matrix	such	that
[1	2	[-1	0	th		what is A	anal ta	
0	$3 \rfloor^{A=}$	6	3	un	en v	vnat is A	equal to):
	F	. 7						
a)	-5	1						
űj	$\lfloor -2 \rfloor$	2						
	[-5	-2]						
b)								

c) 1 2 d)

104. If the least number of zeroes in a lower triangular matrix is 10, then what is the order of the matrix?

- 3×3 4×4 a) b)
- 5×5 c) d) 10×10

105. If
$$l + m + n = 0$$
, then the system of equations
 $-2x + y + z = l \quad x - 2y + z = m \quad x + y - 2z = n$ has

- a trivial solution a)
- no solution b)
- c) a unique solution
- d) infinitely many solutions

, then which one of the -2**106. If** $A = \begin{vmatrix} 2 \\ 1 \end{vmatrix}$ 3 2 1

following is correct?

- A is symmetric matrix a)
- b) A is anti- symmetric matrix
- c) A is singular matrix
- d) A is non-singular matrix
- 107. If |A| = 8, where A is square matrix of order 3, then what is |adj A| equal to?
 - a) 16 b) 24

$$\begin{bmatrix} x & \alpha & 1 \end{bmatrix}$$

108. The roots of the equation $\begin{vmatrix} \beta & x \end{vmatrix}$ 1 = 0 are

independent of

d)
$$\alpha, \beta$$
 and γ

109. If
$$A = \begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$$
 and $B = \begin{bmatrix} 0 & -1 \\ 1 & 2 \end{bmatrix}$, then what is $B^{-1}A^{-1}$ equal to?

a)
$$\begin{bmatrix} 1 & -3 \\ 1 & -2 \end{bmatrix}$$
 b) $\begin{bmatrix} -1 & 3 \\ 1 & -2 \end{bmatrix}$
c) $\begin{bmatrix} -1 & 3 \\ -1 & -2 \end{bmatrix}$ d) $\begin{bmatrix} -1 & -3 \\ 1 & -2 \end{bmatrix}$

110. Consider the following statements:

- A matrix is not a number 1.
- 2. Two determinants of different order may have the same value.

Which of the above statements is/are correct?

- 1 only a) b) 2 only Both 1 and 2
- c) d) Neither 1 nor 2

111. A force $m\hat{i} - 3\hat{j} + \hat{k}$ acts on a point and so the

point moves from (20, 3m, 0) to (0, 0, 7). If the

|1

2 |

wo val	ork done by ue of m?	y the force is	-48 u	nit, wł	nat is	the
a)	5	b)	3			
c)	2	d)	1			
112. If	$\overline{a} = 2\hat{i} - 3j$	$-\hat{k}, \overline{b} = \hat{i} + 4\hat{j}$	$-2\hat{k};$	then	wha	t is
(\overline{a})	$+\overline{b}$)× $(\overline{a}-\overline{b})$	\overline{b}) equal to?				
a)	$2\left(\vec{a}\times\vec{b}\right)$					
b)	$-2(\vec{a}\times\vec{b})$)				
c)	$\left(\vec{a} \times \vec{b}\right)$					
d)	$-\left(\vec{a}\times\vec{b}\right)$					
113. If	$\overline{r_1} = \lambda \hat{i} + 2\hat{j}$	$\hat{j} + \hat{k} \overline{r_2} = \hat{i} + (2 \cdot 1)$	$-\lambda)\hat{j}$	$+3\hat{k}$	are s	such

uch that $|\overline{r_1}| > |\overline{r_2}|$, then λ satisfies which one of the following?

- $\lambda = 0$ only a)
- $\lambda = 1$ b)
- $\lambda < 1$ c)
- $\lambda > 1$ d)
- 114. Consider the diagonals of a quadrilateral formed by the vectors $3\hat{i} + 6\hat{j} - 2\hat{k}$ and $4\hat{i} - \hat{j} + 3\hat{k}$. The quadrilateral must be a
 - Square Rhombus a) b)
 - Rectangle None of these c) d)
- 115. What is the value of b such that the scalar product of the vector $\hat{i} + \hat{j} + \hat{k}$ with the unit vector

parallel to the sum of the vectors $2\hat{i} + 4\hat{j} - 5\hat{k}$ and

b $\hat{i} + 2\hat{j} + 3\hat{k}$ is unity?

a)	-2		b)	-1
c)	0		d)	1

- 116. If the magnitudes of two vectors a and b are equal then which one of the following is correct?
 - $(\overline{a} + \overline{b})$ is parallel to $(\overline{a} \overline{b})$ a)

- $\left(\overline{a}+\overline{b}\right) \bullet \left(\overline{a}-\overline{b}\right)=1$ b)
- $(\overline{a} + \overline{b})$ is perpendicual to $(\overline{a} \overline{b})$ c)
- None of the above d)
- 117. If the magnitude of $\overline{a} \times \overline{b}$ equals to $\overline{a}.\overline{b}$, then which one of the following is correct?
 - $a = \vec{b}$ a)

- The angle between \overline{a} and \overline{b} is 45^o b)
- \vec{a} is parallel to \vec{b} c)
- \overline{a} is perpendicular to b d)
- 118. For non-empty sets A, B and C, the following two statements are given:

Statement $P: A \cap (B \cup C) = (A \cap B) \cup C$

Statement Q:C is a subset of A

Which one of the following is correct?

- a) $P \leftarrow Q$
- $P \Leftrightarrow O$ b)
- $P \Rightarrow O$ c)
- d) Nothing can be said about the correctness of the above three with certainty

119. Which one of the following is correct? The real number
$$\sqrt[3]{2+\sqrt{5}} + \sqrt[3]{2-\sqrt{5}}$$
 is:

- an integer a)
- b) a rational number but not an integer
- an irrational number c)
- d) none of the above

120. Let A = $\{x \in R | -9 \le x < 4\}; B = \{x \in R | -13 < x \le 5\}$

and $C = \{x \in R | -7 \le x \le 8\}$. Then, which one of the following is correct?

a)
$$-9 \in (A \cap B \cap C)$$

b)
$$-7 \in (A \cap B \cap C)$$

c)
$$4 \in (A \cap B \cap C)$$

d)
$$5 \in (A \cap B \cap C)$$
