

RGUCET 2022
MSc in Mathematics

1	If $A = x\%$ of y and $B = y\%$ of x , then which of the following is true?					
	a) $A < B$	b) $A > B$	c) Relationship between A and B cannot be determined	d) $A = B$	d	$A = B$
2	The average of first five multiples of 9 is					
	a) 20	b) 27	c) 28	d) 30	b	27
3	In a throw of dice, what is the probability of getting number greater than 5					
	a) $1/2$	b) $1/3$	c) $1/5$	d) $1/6$	d	$1/6$
4	Find the missing number					
	a) 5	b) 8	c) 4	d) 2	c	4
5	How many rhombuses are there in the following figure?					
	a) 16	b) 13	c) 14	d) 17	c	14
6	I saw a _____ of cows in the field.					
	a) group	b) herd	c) swarm	d) flock	b	herd
7	Jawaharlal spent his childhood _____ Anand Bhawan.					
	a) at	b) in	c) on	d) across	a	at
8	India's P V Sindhu won which medal/position in the Asian Championships 2022?					
	a) Gold	b) Silver	c) Bronze	d) Fourth Place	c	Bronze
9	Shreya Singla, who won a gold medal for India at the 24th Deaf Olympics, plays which sports?					
	a) Shooting	b) Tennis	c) Badminton	d) Table Tennis	c	Badminton
10	Look at this series: 36, 34, 30, 28, 24, ... What number should come next?					
	a) 20	b) 22	c) 23	d) 26	b	22
11	Which interchange of signs will make the following statement true? $7 \times 8 + 6 = 50 - 0 \div 10$					
	a) \times and \div	b) $+$ and $-$	c) $+$ and \times	d) \div and $-$	b	$+$ and $-$
12	Introducing a man, a woman said, "He is the only son of the mother of my mother." How is the man related to the woman?					
	a) Nephew	b) Father	c) Brother	d) Maternal uncle	d	Maternal uncle
13	Find the missing term in? O, I, E, A					
	a) P	b) W	c) U	d) N	c	U
14	Windows is a					
	a) utility software	b) motherboard	c) operating software	d) memory	c	operating software
15	Which of the following is not a computer peripheral?					
	a) Operating System	b) USB cable	c) Pen drive	d) Hard drive	a	Operating System

16	Which of the following is not an award in mathematics?				
	(a) Abel Prize	(b) SASTRA Ramanujan Prize	(c) Fields Medal	(d) Nobel Prize	(d) Nobel Prize
17	The National Mathematics Day of India is celebrated to mark the birth anniversary of which Indian mathematician?				
	(a) Srinivasa Ramanujan	(b) Satyendra Nath Bose	(c) C.R. Rao	(d) K.R. Parthasarthy	(a) Srinivasa Ramanujan
18	According to National Education Policy 2020, the Gross Enrolment Ratio in higher education is to be raised upto what percentage by 2035?				
	(a) 75%	(b) 60%	(c) 50%	(d) 30%	(c) 50%
19	A rectangle of length $2L$ and breadth L is revolved once completely around its length and once around its breadth. The ratio of volumes swept in the two cases is:				
	(a) 1: 2	(b) 2: 3	(c) 1: 3	(d) 3: 4	(a) 1: 2
20	If WORK is coded as 4567 and MAN 328, then WOMAN is coded as				
	(a) 45328	(b) 43528	(c) 45238	(d) 48358	(a) 45328
21	Which of the following word is correct?				
	(a) Etiquete	(b) Ettiquette	(c) Etiquette	(d) Ettiquete	(c) Etiquette
22	Which of these words is an adjective?				
	(a) Output	(b) Cutout	(c) Saccharine	(d) Saccharin	(c) Saccharine
23	Which one of the following mountain ranges is spread over only one state of the India?				
	(a) Aravalli	(b) Satpura	(c) Ajanta	(d) Sahyadri	(c) Ajanta
24	A 'black hole' is a body in space which does not allow any radiation to come out. This property is due to its:				
	(a) Very small size	(b) Very large size	(c) Very low size	(d) Very high density	(d) Very high density
25	The next pair of letters in the series AZ, CX, FU, \dots is:				
	(a) JQ	(b) KP	(c) IR	(d) IV	(a) JQ

26	If a person studies about a fluid which is at rest, what will you call his domain of study				
	a) fluid dynamics	b) fluid statics	c) fluid kinematics	d) fluid dynamics	b) fluid statics
27	The dimensions of speed and velocity				
	a) $[LT^{-1}], [LT^{-1}]$	b) $[LT^{-1}], [LT^{-2}]$	c) $[LT], [LT]$	d) $[LT^{-2}], [LT^{-1}]$	a) $[LT^{-1}], [LT^{-1}]$
28	Which is dimensionless				
	a) energy/ work	b) velocity/acceleration	c) force/acceleration	d) volume/area	a) energy/ work
29	What is the formula of theorem of perpendicular axis?				
	a) $I_{zz} = I_{xx} + I_{yy}$	b) $I_{zz} = I_{xx} + Ah$	c) $I_{zz} - I_{xx} = I_{yy}$	d) $I_{zz} = I_{xx} + Ah^2$	c) $I_{zz} - I_{xx} = I_{yy}$
30	Which of the following statement is false?				
	a) $\nabla = 1 + E^{-1}$	b) $E\Delta = \Delta E$	c) $E^2 = (1 + \Delta)^2$	d) $E^0 = 1$	a) $\nabla = 1 + E^{-1}$
31	A body at rest may have				
	a) Energy	b) Momentum	c) Speed	d) Velocity	(a) Energy
32	The Laplace transform of a unit impulse function				
	a) $\frac{1}{s}$	b) $\frac{1}{s^2}$	c) s	d) 1	a) $\frac{1}{s}$

33	The inverse Laplace transform of $\left(\frac{1}{s+1}\right)$ is					
	a) e^t	b) e^{-t}	c) 1	d) 0	b	e^{-t}
34	The shortcut key which is used to spell check in MS-Word is					
	a) F1	b) F2	c) F7	d) F8	c	F7
35is not the unit of distance.					
	a) angstrom	b) light year	c) micron	d) milestone	d	milestone
36	The unit of work or energy in S.I unit is					
	a) Newton	b) Pascal	c) Joule	d) Watt	c	Joule
37	The points where the Newton Raphson method fails are called					
	a) floating point	b) point of continuity	c) stationary point	d) non-stationary point	c	stationary point
38	A centre of gravity of a semi-circle lies at a distance offrom its base measured along the vertical radius.					
	a) $\frac{4r}{3\pi}$	b) $\frac{3r}{4\pi}$	c) $\frac{4r}{9\pi}$	d) $\frac{8r}{3\pi}$	a	$\frac{4r}{3\pi}$
39	A 5 kg mass at rest on a frictionless table is acted upon by a constant force of 12 N. The distance travelled by it in 2s is					
	a) 1.2 m	b) 2.4 m	c) 4.8 m	d) 9.6 m	c	4.8 m
40	If $P_n(x)$ is Legendre Polynomial of degree $n > 1$, then $\int_{-1}^1 (1+x) P_n(x) dx$ is equal to					
	a) 1	b) $2/(2n+1)$	c) $(n+1)/2$	d) 0	d	0
41	A continuous Image of a compact set is					
	a) Non compact	b) compact	c) bounded	d) open	b	compact
42	The half-closed interval $[a, \infty)$ is					
	a) Open set	b) bounded set	c) Neither open nor closed set	d) Closed set	d	Closed set
43	Let f is continuous on $[a, b]$ and f' exists at each $x \in (a, b)$. Further, if $f' > 0$ in (a, b) , then					
	a) f is strictly increasing.	b) f is strictly decreasing.	c) f is constant.	d) f is decreasing.	a	f is strictly increasing.
44	If S is a set of real numbers which is bounded below, then $\text{Inf } S$ is					
	a) prime number	b) not a point of closure to S	c) a point of closure to S	d) a point of interior to S .	c	a point of closure to S
45	Let f be the function defined on R by setting $f(x) = x - [x], \forall x \in R$. Then, f will be continuous at the points					
	a) 0	b) ± 1	c) ± 2	d) none of (a), (b), (c)	d	none of (a), (b), (c)
46	$\lim_{n \rightarrow \infty} \frac{1+2+3+\dots+n}{n^2}$ is equivalent to					
	a) 1	b) 0	c) $1/2$	d) ∞	c	$1/2$
47	The value of $\Gamma(n) \Gamma(1-n)$ is					
	a) $\frac{2\pi}{\sin n\pi}, n < 1$	b) $\frac{\pi}{\sin n\pi}, n < 1$	c) $\frac{n\pi}{\sin n\pi}, n < 1$	d) $\frac{2n\pi}{\sin n\pi}, n < 1$	b	$\frac{\pi}{\sin n\pi}, n < 1$
48	The value of $\int_0^\pi \int_0^x \sin y dy dx$ is					
	a) $1 + \pi$	b) $2 + \pi$	c) 2π	d) π	d	π
49	The limiting value of $\frac{\tan 2\theta - 2 \sin \theta}{\theta^3}$, as θ tends to zero is					
	a) 0	b) 4	c) 2	d) 3	d	3
50	Which of the following relations is not a function?					
	a) $\{(1,2), (2,3), (3,1)\}$	b) $\{(1,2), (2,2), (3,2)\}$	c) $\{(1,2), (2,3), (1,1)\}$	d) $\{(1,1), (2,2), (3,3)\}$	c	$\{(1,2), (2,3), (1,1)\}$

51	Which is not a root of the equation $x^3 - 3x + 1 = 0$?				
	a) $2 \cos \frac{2\pi}{9}$	b) 2	c) $2 \cos \frac{8\pi}{9}$	d) $2 \cos \frac{14\pi}{9}$	b 2
52	The operation which is commutative but not associative is				
	a) AND	b) EX_NOR	c) OR	d) NAND	d NAND
53	Which of the following proposition is a tautology?				
	a) $p \wedge q$	b) $p \vee \sim p$	c) $p \vee q$	d) $\sim p \wedge q$	b $p \vee \sim p$
54	Conjunctive normal form of the Boolean function $f(x, y) = x.y' + x'.y + x'.y'$ is				
	a) $x'.y'$	b) $x + y$	c) $x' + y'$	d) $x.y$	c $x' + y'$
55	In how many ways can 12 balloons be distributed at a Birthday party among 10 children such that every child gets at least one balloon?				
	a) 55	b) 66	c) 78	d) 120	a 55

56	Suppose G is a group and a is element with order 4; then the inverse of the element (a^3, a^2) in the product group $G \times G$ is				
	a) (a^3, a^2)	b) (a, a^2)	c) (a^3, a^3)	d) $(1, 1)$	b (a, a^2)
57	If $f: X \times Y \rightarrow X$ is surjective, then for all $x \in X$, there exist $a \in X, b \in Y$ such that				
	a) $f(a, a) = x$	b) $f(b, a) = x$	c) $f(a, b) = x$	d) $f(a, b) = b$	c $f(a, b) = x$
58	If \mathbb{R} the set of real numbers is equipped with usual metric, then which of the following is not a closed set				
	a) $\{0\}$	b) $\{1, \frac{1}{2}, \frac{1}{3}, \dots\}$	c) \emptyset	d) \mathbb{R}	b $\{1, \frac{1}{2}, \frac{1}{3}, \dots\}$
59	If the set of real numbers \mathbb{R} is equipped with indiscrete metric, then which of the following is not an open set				
	a) \emptyset	b) \mathbb{R}	c) $A \subsetneq \mathbb{R}$	d) \emptyset, \mathbb{R}	c $A \subsetneq \mathbb{R}$
60	Let R be a relation on the set of positive integers $\mathbb{N} = \{1, 2, 3, 4, \dots\}$ such that mRn if and only if m, n are co-prime. Then R is				
	a) reflexive	b) symmetric	c) transitive	d) anti-symmetric	b symmetric
61	If G is a finite group; then for any $a \in G$;				
	a) $o(a) o(G)$	b) $o(a) = o(G)$	c) $o(a) < o(G)$	d) $o(\langle a \rangle) = o(G)$	a $o(a) o(G)$
62	If G is a group and H is a subgroup of G , then the set of all left cosets of H is group provided				
	a) $o(H) o(G)$	b) $o(H) = o(G)$	c) $o(H) < o(G)$	d) $aH = Ha \forall a \in G$	d $aH = Ha$
63	The area of the parallelogram bounded by $y=3x+7, y=3x-2, x=0$, and $x=5$ is				
	a) 15	b) 45	c) 0	d) 40	b 45
64	A substitution $x = \frac{2}{5} \sec \theta$ then radical $\sqrt{25x^2 - 4}$ is				
	a) $\tan \theta$	b) $2 \tan \theta$	c) $3 \tan \theta$	$\frac{2}{3} \tan \theta$	b $2 \tan \theta$
65	The number of stationary points of $f(x) = x^2(1-x)^3$ is				
	a) 1	b) 2	c) 3	d) 4	c 3

66	For the function f				
	$\lim_{x \rightarrow \frac{1}{2}^-} f(x), \lim_{x \rightarrow \frac{1}{2}^+} f(x)$ are				
	a) 2, -1	b) 2, 2	c) -1, -1	d) 1, 1	a) 2, -1
67	$\lim_{x \rightarrow -\infty} \frac{3x^3 + 8x + 1}{2x^2 + 7x}$ is				
	a) ∞	b) $-\infty$	c) $\frac{3}{2}$	d) 0	b) $-\infty$
68	$\lim_{x \rightarrow 0} x \cos\left(\frac{n\pi}{x}\right)$ is equal to				
	a) 1	b) ∞	c) -1	d) 0	d) 0
69	$\lim_{x \rightarrow -\infty} \left(\frac{1+2e^x}{1-e^x}\right)$ is equal to				
	a) 1	b) -1	c) ∞	d) $-\infty$	a) 1
70	If g is an element of order 6 in a group G , then values of k for which g^k has order 6 are				
	a) 2, 5	b) 3, 5	c) 2, 3, 5	d) 5	d) 5
71	The angle between the lines represented by $x^2 + xy - 6y^2 = 0$ is				
	a) 135°	b) 45°	c) 90°	d) -60°	a) 135°
72	The second degree equation $ax^2 + by^2 + 2hxy + 2gx + 2fy + c = 0$ represents a circle if				
	a) $a = b = h \neq 0$	b) $a \neq b$ but $h = 0$	c) $a = b$ and $h \neq 0$	d) $a = b$ and $h = 0$	d) $a = b$ and $h = 0$
73	The radius of the sphere $x^2 + y^2 + z^2 - 2x + 4y - 6z = 11$ is				
	(a) 25	(b) 5	(c) $\sqrt{5}$	(d) $5\sqrt{5}$	b) 5

74	If $z = 1 + i\sqrt{3}$, then $ \arg z + \arg \bar{z} $ is equal to				
	(a) $\frac{2\pi}{3}$	(b) $\frac{3\pi}{2}$	(c) 0	(d) $\frac{11\pi}{6}$	(a) $\frac{2\pi}{3}$
75	The maximum value of $ z $ such that $ z^2 - 2z = 2 z $ is				
	(a) $1 + \sqrt{3}$	(b) $\sqrt{3} - 1$	(c) $1 + i\sqrt{3}$	(d) $\sqrt{2} + 1$	(a) $1 + \sqrt{3}$
76	Let $f(z) = u(x, y) + iv(x, y)$ be an analytic function. Which of the following true?				
	(a) $u_{xx} - v_{yx} = 0$	(b) $u_{yy} + v_{xy} = 0$	(c) $u_{yy} + u_{xx} = 0$	(d) $u_{yy} + v_{xx} = 0$	(c) $u_{yy} + u_{xx} = 0$
77	If $z = x + iy$, then the real part of the function $f(z) = \log z$ is				
	(a) $\frac{x^2 + y^2}{2}$	(b) $\sqrt{x^2 + y^2}$	(c) $\frac{\log(x^2 + y^2)}{2}$	(d) $\log(x^2 + y^2)$	(c) $\frac{\log(x^2 + y^2)}{2}$

78	Let C be a positively oriented circle $ z = 3$ and $g(z) = \int_C \frac{2s^2 - s - 2}{s - z} ds$. Then the value of $g(z)$ when $ z > 3$ is					
	(a) πi	(b) $24\pi i$	(c) $2\pi i$	(d) 0	(d)	0
79	The polar form of the complex number $z = -3i$ is					
	(a) $3e^{3\pi/2}$	(b) $3e^{3\pi i/2}$	(c) $\sqrt{3}e^{3\pi/2}$	(d) $\sqrt{3}e^{3\pi i/2}$	(b)	$3e^{3\pi i/2}$
80	If a and b are integers, not both of which are zero, then $\gcd(2a + 3, 4a + 5)$ is					
	(a) 8	(b) 4	(c) 2	(d) 1	(d)	1
81	The remainder when 2^{50} is divided by 7 is					
	(a) 1	(b) 2	(c) 3	(d) 4	(d)	4
82	The number of incongruent modulo 42 solutions of the linear congruence $18x \equiv 30 \pmod{42}$ is					
	(a) 7	(b) 6	(c) 4	(d) 3	(b)	6
83	If $\phi(n)$ is Euler's phi function, then $\phi(125)$ is equal to					
	(a) 25	(b) 75	(c) 100	(d) 124	(c)	100
84	Which of the following is not a measure of dispersion?					
	(a) Range	(b) Median	(c) Mean deviation	(d) Standard deviation	(b)	Median
85	Let X be a random variable, then $\text{Var}(aX + b)$ is (here Var is Variance)					
	(a) 0	(b) $a \text{Var}(X)$	(c) $a^2 \text{Var}(X)$	(d) $a^2 \text{Var}(X) + b$	(c)	$a^2 \text{Var}(X)$
86	If $r^2 = x^2 + y^2 + z^2$, then the value of $\vec{\nabla}f(r)$ is					
	(a) $-\frac{\vec{r}}{r} \frac{df}{dr}$	(b) $\frac{\vec{r}}{r} \frac{df}{dr}$	(c) $\frac{\vec{r}}{r^2} \frac{df}{dr}$	(d) $-\frac{\vec{r}}{r^2} \frac{df}{dr}$	b	$\frac{\vec{r}}{r} \frac{df}{dr}$
87	The expression of the radial acceleration of the moving point in the plane curve is:					
	(a) $\frac{d^2\vec{r}}{dt^2} + \vec{r} \left(\frac{d\theta}{dt}\right)^2$	(b) $\frac{d^2\vec{r}}{dt^2} - \vec{r} \left(\frac{d\theta}{dt}\right)^2$	(c) $-\frac{d^2\vec{r}}{dt^2} - \vec{r} \left(\frac{d\theta}{dt}\right)^2$	(d) $\frac{d^2\vec{r}}{dt^2} - \frac{d\vec{r}}{dt} \frac{d\theta}{dt}$	(b)	$\frac{d^2\vec{r}}{dt^2} - \vec{r} \left(\frac{d\theta}{dt}\right)^2$
88	The curl of $\vec{A} = (x^2 + yz)\hat{i} + (y^2 + xz)\hat{j} + (z^2 + yx)\hat{k}$ at $(1, 2, 3)$ is:					
	(a) 0	(b) -1	(c) 2	(d) 6	a	0
89	The order of the differential equation $\frac{d^2y}{dx^2} + \sqrt{\sin x + \left(\frac{dy}{dx}\right)^2} = 0$ is:					
	(a) 1	(b) 2	(c) 3	(d) 4	b	2
90	Integrating factor of the differential equation $(1 + x^2)\frac{dy}{dx} + y = x \tan^{-1} x$ is:					
	(a) $e^{\tan x}$	(b) $e^{\tan^{-1} x}$	(c) $\tan x$	(d) $e^{-\tan x}$	b	$e^{\tan^{-1} x}$
91	The differential equation $M(x, y)dx + N(x, y)dy = 0$ is exact if and only if:					
	(a) $\frac{\partial N}{\partial y} - \frac{\partial M}{\partial x} = 0$	(b) $\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} = 0$	(c) $\frac{\partial^2 M}{\partial x^2} - \frac{\partial^2 N}{\partial y^2} = 0$	(d) $\frac{\partial^2 N}{\partial x^2} - \frac{\partial^2 M}{\partial y^2} = 0$	b	$\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} = 0$

92	The orthogonal trajectory of the family of the family of co-axial circles $x^2 + y^2 + 2gx + c = 0$, where g is the parameter is:					
	(a) $x^2 + y^2 + 2fy - c = 0$	(b) $x^2 + y^2 - 2fx + c = 0$	(c) $x^2 + y^2 + 2fx + c = 0$	(d) $x^2 + y^2 - c = 0$	a	$x^2 + y^2 + 2fy - c = 0$
93	The solution of the differential equation $(2x^2 + y)dx + (x^2y - x)dy = 0$ is:					
	(a) $2x + \frac{y^2}{2} - \frac{y}{x} = c$	(b) $2x + \frac{y^2}{2} + \frac{y}{x} = c$	(c) $2x - \frac{y^2}{2} - \frac{y}{x} = c$	(d) $2x + \frac{y^2}{2} - y = c$	a	$2x + \frac{y^2}{2} - \frac{y}{x} = c$
94	The solution of the differential equation $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = 0$ is:					
	(a) $y = c_1e^{-x} + c_2e^{-2x}$,	(b) $y = c_1e^x + c_2e^{-2x}$	(c) $y = c_1e^{-x} + c_2e^{2x}$	(d) $y = c_1e^x + c_2e^{2x}$	a	$y = c_1e^{-x} + c_2e^{-2x}$
95	The Wronskian of the two linearly independent solutions of the differential equation $\frac{d^2y}{dx^2} + \lambda^2y = 0$ is:					
	(a) $\sin \lambda$	(b) $\cos \lambda$	(c) λ	(d) λ^2	c	λ
96	The curve passing through the point (1,1) in the xy – plane having at each of its points the slope $-y/x$ is:					
	(a) $xy = 1$	(b) $xy = 2$	(c) $x^2 - y^2 = 0$	(d) $x^2 + y^2 = 2$	a	$xy = 1$
97	The initial value problem $\left \frac{dy}{dx} \right + y = 0, y(0) = 1$ has:					
	(a) No solution	(b) Only one solution.	(c) Infinitely many solutions.	(d) Bounded solution.	a	No solution
98	Which of the following is not a valid variable name declaration?					
	(a) <code>int _a3</code>	(b) <code>int a_3</code>	(c) <code>int 3_a</code>	(d) <code>int _3a</code>	c	<code>int 3_a</code>
99	What is the precedence of arithmetic operators (from highest to lowest)?					
	(a) $\%, *, /, +, -$	(b) $\%, +, /, *, -$	(c) $+, -, \%, *, /$	(d) $\%, +, -, *, /$	a	$\%, *, /, +, -$
100	Which among the following is NOT a logical or relational operator?					
	(a) <code>!=</code>	(b) <code>==</code>	(c) <code> </code>	(d) <code>=</code>	d	<code>=</code>