RGUCET 22
Common Entrance Test, 2022
Ph.D. IN MATHEMATICS

1	According to National Education Policy 2020, the current 10+2 school system is to be replaced by a new curricular structure. What is the new curricular structure?					
	(a) $5+5+2+3$	(b)$5+3+3+4$	(c) $5+3+2+5$	(d) $5+5+5$	(b)	$5+3+3+4$
2	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)	$1:2$
3	Determining the relationships between two or more variables comes under					
	(a) Survey research	(b) Correctional research	(c) Action research	(d) Naturalistic observation	(b)	Correctional research
4	If in certain coding system MOTHER is written as PQWJHT, then SISTER will be coded as					
	(a) VRVVST	(b) VKVVHT	(c) VRKHSW	(d) VKVVHU	(b)	VKVVHT
5	The Journal Impact Factor was devised by					
	(a) Eugene Garfield	(b) Jorge E. Hirsch	(c) Alan Pritchard	(d) Felix de Moya	(a)	Eugene Garfield
6	What is the name of the conceptual framework in which the research is carried out?					
	a) Research hypothesis	b) Synopsis of research	c) Research paradigm	d) Research design	d	Research design
7	Which of the following features are considered as critical in qualitative research?					
	a) Collecting data with the help of standardize research tools	b) Design sampling with probability sample techniques	c) Collecting data with bottom-up empirical evidence	D) Gathering data with top-down schematic evidence	c	Collecting data with bottom-up empirical evidence
8	In order to pursue the research, which of the following is priority required?					

	a) Developing a research design	b) Formulating a research question	c) Deciding about the data analysis procedure	d) Formulating a research hypothesis	b	Formulating a research question
9	The format of thesis writing is the same as in					
	a) Writing seminar representation	b) Preparation of research paper/article	c) A research dissertation	d) Presenting a workshop/conference paper	c	A research dissertation
10	A statement about a population developed for the purpose of testing is called					
	a) Hypothesis	b) Hypothesis testing	c) Level of significance	d) Test-statistic	a	Hypothesis
11	Any hypothesis which is tested for the purpose of rejection under the assumption that it is true is called					
	a) Null hypothesis	b) Alternative hypothesis	c) Statistical hypothesis	d) Composite hypothesis	a	Null hypothesis
12	The number of independent values in a set of values is called					
	a) Test-statistic	b) Degree of freedom	c) Level of significance	d) Level of confidence	b	Degree of freedom
13	The section of the CPU that is responsible for performing mathematical operations					
	a)monitor	b) memory unit	c) control unit	d) ALU	d	ALU
14	Which of the following is not information technology?					

	a) cloud computing	b) blu-ray	c) virus	d) big data analysis	c	virus
15	One essential criterion of scientific study is					
	a) belief	b) value	c) objectivity	d) subjectivity	c	objectivity
16	Inappropriate application of ICT in research is an example of					
	a) Technical lapse on the part of the researcher.	b) Inadequate provision of ICT resources.	c) Violation of research ethics	d) Absence of technical expertise of ICT resources.	d	Absence of technical expertise of ICT resources.
17	Ethical norms in research do not involves guidelines for					
	a) Thesis format	b) copyright	c) Patenting policy	d) Data sharing	a	Thesis format
18	What is the last digit of 7^{73}?					
	a) 9	b) 7	c) 3	d) 1	a	9
19	Research related to abstract ideas or concepts is					
	a) Empirical research	b) Conceptual research	c) Quantitative research	d) Qualitative research	b	Conceptual research
20	The method of drawing conclusions based on the observation of each and every instance of a population is called					

	a) Scientific method	b) Deductive method	c) Inductive method	d) Dialectic method	c	Inductive method
21	Which of the following is a measure of location					
	a) Standard deviation	b) percentile	c) mode	d) mean	b	percentile
22	Artificial Intelligence is about_____.					
	a) Playing a game on Computer	b)Programming on Machine with your Own Intelligence	c)Making a machine Intelligent	d)Putting your intelligence in Machine	c)	Making a machine Intelligent
23	RashtriyaUchchatar Shiksha Abhiyan (RUSA) has been approved for continuation till which year?					
	a) 2024	b) 2026	c) 2030	d) 2032	b)	2026
24	In the series $POQ,\ SRT,\ VUW, \ldots$, the blank space refers to					
	a) XYZ	b) XZY	c) YXZ	d) YZY	c)	YXZ
25	WiMAX is related to which one of the following:					
	a) Biotechnology	b) Space technology	c) Missile technology	d) Communication technology	d)	Communication technology
26	Let x and y be two linearly dependent vectors in a Hilbert space. Then					

	(a) $\lvert < x,y > \rvert \leq \lVert x \rVert \lVert y \rVert$	(b) $\lvert < x,y > \rvert = \lVert x \rVert \lVert y \rVert$	(c) $\lvert < x,y > \rvert \geq \lVert x \rVert \lVert y \rVert$	(d) $\lvert < x,y > \rvert \neq \lVert x \rVert \lVert y \rVert$	(b)	$\lvert < x,y > \rvert = \lVert x \rVert \lVert y \rVert$
27	If T is a normal operator in a Hilbert space H, then					
	(a) $\lVert T \rVert^2 = \lVert T^2 \rVert$	(b)) $\lVert T \rVert^2 \geq \lVert T^2 \rVert$	(c)) $\lVert T \rVert^2 \leq \lVert T^2 \rVert$	(d)) $\lVert T \rVert^2 = \lVert T^2 \rVert + 1$	(a)	$\lVert T \rVert^2 = \lVert T^2 \rVert$
28	Let $\alpha = (\alpha_1, \alpha_2, \alpha_3) \in \mathbb{R}^3$ be a fixed. Define the functional $f: \mathbb{R}^3 \to \mathbb{R}$ by $f(x) = \alpha \cdot x = \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3$, for all $x = (x_1, x_2, x_2) \in \mathbb{R}^3$. Then					
	(a) f is linear but unbounded	(b) f is bounded but not linear.	(c) f is linear and bounded.	(d) f is neither linear nor bounded.	(c)	f is linear and bounded
29	Let H be a Hilbert space and M be a closed subspace of H. Then which of the following is not true?					
	(a) $M^{\perp}$ is also a closed subspace of H.	(b) $H = M^{\perp} \oplus M$	(c) $M^{\perp} \cap M = \emptyset$	(d) $M^{\perp} \cap M = \{0\}$	(c)	$M^{\perp} \cap M = \emptyset$
30	Let f be a bounded linear functional on a subspace Y of a normed linear space X. Then there exists a linear functional F on X which is an extension of f to X which satisfies					
	(a) $\lVert f \rVert < \lVert F \rVert = 1$	(b) $\lVert f \rVert \neq \lVert F \rVert$	(c) $\lVert f \rVert < \lVert F \rVert \neq 1$	(d) $\lVert f \rVert = \lVert F \rVert$	(d)	$\lVert f \rVert = \lVert F \rVert$
31	Let $f(z) = (z^2+1)^2/(z^2+2z+2)^3$ and C be the circle $\lvert z \rvert = 4$. Then $\frac{1}{2\pi i}\int_C \{f'(z)/f(z)\}dz$ is equal to					
	(a) -2	(b) -1	(c) 0	(d) 1	(a)	-2
32	Let $f(z)$ has a zero of order m at z_0. Then the residue of $(zf'(z))/f(z)$at z_0 is					
	(a) m	(b) mz_0	(c) m/z_0	(c) z_0	(b)	mz_0
33	A bilinear transformation with only one fixed point is called					
	(a) elliptic	(b) parabolic	(c) hyperbolic	(d) loxodromic	(b)	parabolic

34	If z_1 and z_2 are conjugate complex numbers, and also z_3 and z_4 are conjugate. Then $\arg(z_3/z_2)$ is equal to					
	(a) $\arg(z_4/z_1)$	(b) $\arg(z_2/z_3)$	(c) $\arg(z_1/z_4)$	(d) $\arg(z_2/z_4)$	(c)	$\arg(z_1/z_4)$
35	The minimum number of vertices necessary for a simple graph with six edges to be planar is					
	(a) 5	(b) 7	(c) 3	(d) 4	(d)	4
36	Let T be a tree with fivevertices. The number of different ways of properly colouring the tree T with four colours is					
	(a) 24	(b) 120	(c) 320	(d) 324	(d)	324
37	For $n \geq 3$, the Euler's function $\phi(n)$is					
	(a) always an even.	(b) always an odd.	(c) always divisible by $2n-1$	(d) always divisible by $n/2$	(a)	always an even.
38	If A and B are mutually exclusive events in a random experiment, then $P(A \cup B)$ (here P denotes probability) is					
	Let A and B be two events of a random experiment such that probabilities $P(A) = p$, $P(B) = q$ and $P(A \cap B) = r$, then $P(B/\overline{A})$ is					
	(a) $(r-q)/(1-q)$	(b) $q/(1-p)$	(c) $(q-r)/(1-p)$	(d) $q-1+p$	(c)	$(q-r)/(1-p)$
39	The probability density function of a random variable X is given by $f(x) = 6x(1-x)$, $0 \leq x \leq 1$. Then the value of k satisfying $P(X < k) = P(X > k)$ is					
	(a)$2/3$	(b) $(1-\sqrt{3})/2$	(c) $(1+\sqrt{3})/2$	(d) $1/2$	(d)	$1/2$
40	The joint probability distribution of random variables X and Y is given by $f(x,y) = 4xye^{-(x^2+y^2)}$; $x \geq 0, y \geq 0$. Then the conditional probability density function of X given Y is					
	(a) $2xe^{-y^2}, x, y \geq 0$	(b) $2ye^{-y^2}, y \geq 0$	(c) $2ye^{-x^2}, x, y \geq 0$	(d) $2xe^{-x^2}, x, \geq 0$	(d)	$2xe^{-x^2}, x, \geq 0$

41	The dimensional formula for relative density is					
	a) $[M^0L^0T^0]$	b) $[M^0L^0T^{-1}]$	c) $[M^0L^{-3}]$	d) $[M^0L^0T^2]$	a	$[M^0L^0T^0]$
42	The ratio of inertia force to viscous force is					
	a) Fourier number	b) Prandtl number	c) Reynolds number	d) viscosity	c	Reynolds number
43	The physical quantity that has no dimensions is					
	a) strain	b) angular momentum	c) angular velocity	d) linear momentum	a	strain
44	Euler form of momentum equations does not involve this property					
	a) strain	b) stress	c) friction	d) temperature	c	friction
45	To which of these flows, the Euler equation is applicable					
	a) Couette flow	b) Potential flow	c) Stokes flow	d) Poiseuille's flow	b	Potential flow
46	What will be the shape of the pathline for a one-dimensional flow be like?					
	a) straight line	b) parabolic	c) hyperbolic	d) elliptic	a	straight line
47	What is the equation of streamline in an unsteady flow?					
	a) $x = y$	b) $y = 0$	c) $x = 0$	d) $y = xt$	d	$y = xt$
48	The flow in which streamlines are directed away from the origin is called as					
	a) sink flow	b) doublet flow	c) source flow	d) source-sink flow	c	source flow
49	Stream function is defined for					
	a) 1D flow	b) 2D flow	c) 3D flow	d) 5D flow	b	2D flow
50	When velocity potential (ϕ) exists, the flow is					
	a) rotational flow	b) irrotational flow	c) laminar flow	d) turbulent flow	b	irrotational flow

51	Vortices are a major component of					
	a) Lifting flow	b) Non-lifting flow	c) Doublet flow	d) Turbulent flow	d	Turbulent flow
52	The free vortex flow forms…….					
	a) straight lines	b) parabola	c) hyperbola	d) concentric circles	d	concentric circles
53	When both the source and sink are of equal strength it is called					
	a) sink	b) source	c) doublet	d) linear flow	c	doublet
54	When the velocity at a point becomes zero, it refers to					
	a) slip condition	b) no slip condition	c) positive slip condition	d) negative slip condition	b	no slip condition
55	The algorithm provided to find the roots of the function using Bisection Method is given by					
	a) Bolzano's theorem	b) Mean value theorem	c) Bisection's theorem	d) Secant theorem	a	Bolzano's theorem
56	All Sylow's $p-$subgroups of a finite group are					
	a)Conjugate to each other	b)Normal	c) B oth A and B are fals	d)Both A and B are true	a	Conjugate to each other
57	The even permutations are permutations which can be expressed as product of					
	a) even number cyclic permutations	b) even number acyclic permutations	c) even number transposition	d) none of the above	c	even number transposition
58	If $*: G \times G \to G$ function, where G is a nonempty set, then					

	a) $(G,*)$ is necessarily a group	b) $(G,*)$ is monoid	c) $(G,*)$ is a semigroup	d) $(G,*)$ is an algebraic structure	d	$(G,*)$ is an algebraic structure
59	If $f: X \times X \to X$ is such that $f(x,y)$ is unique for all $x, y \in X$, then f is a					
	a) function	b) Multi-valued function	c) One-one function	d) Relation but not a function	a	function
60	If a transportation problem having 4 supply points and 5 demand points, then number of constraints is equal to					
	a) 20	b) 10	c) 9	d) 1	c	9
61	A necessary condition that $\mathbb{Z}_n$ is a field is					
	a) n must be odd	b) n must be even	c) n must be composite	d) n must be prime	d	n must be prime
62	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) $\{1, \frac{1}{2}, \frac{1}{3}, \ldots\}$	c) ϕ	d) $\mathbb{R}$	b	$\{1, \frac{1}{2}, \frac{1}{3}, \ldots\}$
63	If G is a finite group; then for any $a \in G$;					
	a) $o(a) \mid o(G)$	b) $o(a) = o(G)$	c) $o(a) < o(G)$	d) $o(< a >) = o(G)$	a	$o(a) \mid o(G)$
64	If F is field, then F[x] is					
	a) $\{0\}$	b) F	c) Euclidean domain	d) None of these above	c	Euclidean domain

65	If R is an integral domain , f(x), g(x) ∈ R[x], then degree(f.g) ..... degree f + degree g .					
	a) $>$	b) $<$	c) $=$	d) $\leq$	c	=
66	Quotient field of Z is					
	a) $\mathbb{Z}$	b) $\mathbb{Q}$	c) $\mathbb{R}$	d) $\mathbb{C}$	b	$\mathbb{Q}$
67	Let f be a ring homomorphism, then prove that f is one-one iffKer f = ...					
	a) $\{0\}$	b) ϕ	c) $\{-1,-1\}$	d) None of the above	a	$\{0\}$
68	Characteristic of every field is either zero or_____					
	a) even numbe r	b) odd number	c) prime number	d) composite number	c	prime number
69	If $X = \{0,1\}$ is equipped with discrete topology, then X is					
	a) connect ed	b) compact	c) both connected and compact	d) neither connected nor compact	b	compact
70	Number of generators in an infinite cyclic group is					
	a) 0	b) 1	c) 2	d) infinite	c	2
71	The intersection of all sets of the form, $O_n = \left(-\frac{1}{n}, \frac{1}{n}\right), n = 1,2, \ldots$, is					
	a)Open set	b)$\{0\}$	c)Closed set	d)Null set	b	$\{0\}$
72	Let $\sum u_n$ be a series of positive terms and let $\lim_{n\to\infty} u_n^{1/n} = l$. Then, which among the following does not express the condition for the Cauchy's nth root test					
	a)If $l <$ $1, \sum u_n$conver ges	b)If $l >$ $1, \sum u_n$diverge s	c)If $l = 1$, the test fails and the series may either converge or	d)If $l = 0$, the series neither converges nor diverges	d	If $l = 0$, the series neither converges nor diverges

			diverge			
73	The set of limit points of a bounded sequence is					
	a) unbounded	b)bounded	c) not necessarily bounded	d) neither bounded nor unbounded	b	bounded
74	Which amongst the following statement is not true?					
	a) a sequence cannot converge to more than one limit point.	Every convergent sequence is bounded	c) Every bounded sequence is convergent.	d) Limit of a sequence is unique	c	Every bounded sequence is convergent.
75	If $a_n = \sqrt{n+1} - \sqrt{n}$, then $\lim_{n\to\infty} a_n$ is equal to					
	a) 1	b) 0	c) ∞	d) -1	b	0
76	Let a function $f: [-1,1] \to \mathbb{R}$ be defined by $f(x) = \begin{cases} x \sin 1/x, & if\ x \neq 0 \\ 0, & if\ x = 0 \end{cases}$. Then					
	a) f is continuous and has unbounded variation on [−1, 1].	b) f is discontinuous and has unbounded variation on [−1, 1].	c) f is continuous and has bounded variation on [−1, 1].	d) f is discontinuous and has bounded variation on [−1, 1].	a	f is continuous and has unbounded variation on [−1, 1].
77	If we take $g(x) = x$ and$h(x) = 1$ in general mean value theorem, we obtain					
	a) Rolle's theorem	b) Cauchy's mean value theorem	c) Lagrange's mean value theorem	d) None of the above	c	Lagrange's mean value theorem
78	Let a function$f$ be defined by $f(x) = \begin{cases} x^m \sin 1/x, & if\ x \neq 0 \\ 0, & if\ x = 0 \end{cases}$. Then, the value of m, when f is					

	continuous at $x = 0$, is					
	a) $m \geq 3$	b) $m \leq 2$	c) $0 \leq m < 2$	d) $0 \leq m < 1$	a	$m \geq 3$
79	The C-preprocessors are specified with _____ symbol.					
	a) &	b) #	c) %	d) $	b	#
80	Which of the following loop is executed at least once?					
	a) $for\ loop$	b) $while\ loop$	c) $do\ while\ loop$	d) $switch$	c	$do\ while\ loop$
81	A plane curve of fixed perimeter and maximum area is					
	a) Pentagon	b) rectangle	c) circle	d) square.	c	circle
82	The major error that occurs due to the finite difference approximation is					
	a) Discretization error	b) Iteration error	c) Round off error	d) Modelling error	a	Discretization error
83	Order of the difference equation $y_{(n+2)} - 2y_{(n)} + y_{(n-1)} = 1$ is					
	a) 1	b) 2	c) 3	d) 4	c	3
84	The necessary condition that the functional $I[y(x)]$ will have extremum is					
	a) $\delta I = constant$	b) $\delta I \neq 0$	c) $\delta I = 0$	d) $\delta I \neq constant$	c	$\delta I = 0$
85	The shortest distance between the parabola $y = x^2$ and the straight line $x - y = 5$ is					
	a) $\frac{19\sqrt{2}}{8}$	b) $\frac{27\sqrt{2}}{8}$	c) $\frac{23\sqrt{2}}{8}$	d) $\frac{25\sqrt{2}}{8}$	a	$\frac{19\sqrt{2}}{8}$
86	Which of the following differential equations is exact:					
	(a) $(x^2 + y)dx - xdy = 0$	(b) $(x + y - 3)dy + (x + 2y - 3)dx = 0$	(c) $(x^2 - y)dx - xdy = 0$	(d) $(x^2 + y)dx + xydy = 0$	(c)	$(x^2 - y)dx - xdy = 0$

87	The solution of the initial value problem $\frac{d^2y}{dx^2}+\frac{dy}{dx}-6y=0,\ y(0)=6,\ y'(0)=2$ is:					
	(a) $y(x)=2e^{2x}+4e^{-3x}$	$(b)\ y(x)=2e^{-2x}+4e^{3x}$	$(c)y(x)=8e^{2x}-2e^{-3x}$	$(d)y(x)=6e^{x/3}$	(a)	$y(x)=2e^{2x}+4e^{-3x}$
88	The initial value problem $\frac{dy}{dx}=y^{1/3},\ y(0)=0$ has:					
	(a) Unique solution	(b) No solution	(c) Finitely many solutions	(d) Infinitely many solutions	(d)	Infinitely many solutions
89	An differential equation $\frac{dy}{dx}=Q(x)y^n-P(x)y$,where $n\neq 0,1$ is known as:					
	(a) Linear differential equation	b) Bernoulli differential equation	c) Clairaut differential equation	d) General Riccati's equation.		Bernoulli differential equation
90	The Wronskian of the linearly independent solution of the differential equation $\frac{d^3y}{dx^3}-2\frac{d^2y}{dx^2}-\frac{dy}{dx}+2y=0$ is:					
	(a) $6e^{2x}$	(b) $-6e^{-2x}$	(c) e^{2x}	(d) $-6e^{2x}$	(d)	$-6e^{2x}$
91	Eigenvalue of the integral equation $y(x)=\lambda\int_0^1 e^{x+t}y(t)dt$ are:					
	(a) $\lambda=\frac{2}{e^2}$	(b) $\lambda=\frac{2}{e^2-1}$	(c) $\lambda=\frac{1}{e-1}$	(d) $\lambda=\frac{2}{e^2+1}$	(b)	$\lambda=\frac{2}{e^2-1}$
92	The solution of the integral equation $f(t)=s+s\int_0^1 u^2f(u)du$ is given by					
	(a) $f(t)=3t/4$	(b) $f(t)=$	(c) $f(t)=$	(d) $f(t)=$		$f(t)=4t/3$

		$4t/3$	$2t/3$	$3t/2.$	(b)	
93	Solution of the integral equation $\int_0^x e^{x-t}y(t)dt = \sin x$ is:					
	(a) $y(x) = \cos x$	(b) $y(x) = \sin x$	(c) $y(x) = e^x + \sin x$	(d) $y(x) = \cos x - \sin x$	(d)	$y(x) = \cos x - \sin x.$
94	The resolvent kernel of the kernel $k(x,t) = e^{x+t}, a = 0, b = 1$ is:					
	(a) $\frac{2e^{x+t}}{2-\lambda(e^2+1)}$	(b) $\frac{2e^{x+t}}{2+\lambda(e^2-1)}$	(c) $\frac{2e^{x+t}}{2-\lambda(e^2-1)}$	(d) $\frac{2e^{x+t}}{2-\lambda e^2}$	(c)	$\frac{2e^{x+t}}{2-\lambda(e^2-}$
95	The solution of the integral equation $t = \int_0^t e^{t-u}F(u)du$is:					
	(a) $F(t) = 1 + 2t$	(b) $F(t) = 1 - t$	(c) $F(t) = t^2$	(d) $F(t) = 1 + t^2$	(b)	$F(t) = 1 - t$
96	The differential equation obtained by eliminating arbitrary constants a and b from $z = (x-a)^2 + (y-b)^2$ is:					
	(a) $\left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2 = 4z$	(b) $\left(\frac{\partial z}{\partial x}\right)^2 - \left(\frac{\partial z}{\partial y}\right)^2 = 4z$	(c)$\left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2 = 4$	(d) $\left(x\frac{\partial z}{\partial x}\right)^2 + \left(y\frac{\partial z}{\partial y}\right)^2 = 4.$	(a)	$\left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2 = 4z$
97	The Differential equation of the set of all right circular cones whose axis coincides with z-axis is:					
	(a) $y\frac{\partial z}{\partial x} = x\frac{\partial z}{\partial y}$	(b) $x\frac{\partial z}{\partial x} = y\frac{\partial z}{\partial y}$	(c) $y\frac{\partial z}{\partial x} + x\frac{\partial z}{\partial y} = 0$	(d) $x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y} = 0$	(a)	$y\frac{\partial z}{\partial x} = x\frac{\partial z}{\partial y}$
98	The equation $(2x+3y)\frac{\partial z}{\partial x} + 4x\frac{\partial z}{\partial y} - 8\frac{\partial z}{\partial x}\frac{\partial z}{\partial y} = x + y$ is:					

	(a) Linear	(b) Non-linear	(c) Quasi-linear	(d) Semi-linear	(b)	Non-linear
99	The partial differential equation $xy\frac{\partial^2 z}{\partial x^2} - (x^2 - y^2)\frac{\partial^2 z}{\partial x \partial y} - xy\frac{\partial^2 z}{\partial y^2} + y\frac{\partial z}{\partial x} - x\frac{\partial z}{\partial y} = 2(x^2 - y^2)$ in the domain $D = \{(x, y) \in \mathbb{R}^2 : (x, y) \neq (0,0)\}$ is:					
	(a) Parabolic	(b) Elliptic	(c) Hyperbolic	(d) Elliptic for $x < 0$	(c)	Hyperbolic
100	Characteristics curves of the differential equation $\frac{\partial^2 z}{\partial x^2} - x^2\frac{\partial^2 z}{\partial y^2} = 0$ are:					
	(a) $2y + x^2 = c_1, 2y - x^2 = c_2$	(b) $y + x^2 = c_1, y - x^2 = c_2$	(c) $2x + y^2 = c_1, 2x - y^2 = c_2$	(d) $y + x = c_1, y - x = c_2$	(a)	$2y + x^2 = c_1, 2y - x^2 = c_2$