Test Booklet No. ____________

This booklet consists of 100 questions and 11 printed pages.

RGUCET/2024/__/_

Series NIL

RGUCET 2024

Common Entrance Test, 2024

MASTER OF SCIENCE (MATHEMATICS & COMPUTING)

Full Marks: 100 **Time: 2 Hours**

Roll No. | | | | | | | | |

Day and Date of Examination: ______________________________________

Signature of Invigilator(s) ____

Signature of Candidate ____

General Instructions:

PLEASE READ ALL THE INSTRUCTIONS CAREFULLY BEFORE MAKING ANY ENTRY.

1. DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO.
2. Candidate must write his/her Roll Number on the space provided.
3. This Test Booklet contains 100 Multiple Choice Questions (MCQs) from the concerned subject. Each question carries 1 mark. There shall be negative marking of 0.25 against each wrong attempt.
4. Please check the Test Booklet to verify that the total pages and total number of questions contained in the test booklet are the same as those printed on the top of the first page. Also check whether the questions are in sequential order or not.
5. Candidates are not permitted to enter into the examination hall after the commencement of the entrance test or leave the examination hall within one hour thirty minutes.
6. Making any identification mark in the OMR Answer Sheet or writing Roll Number anywhere other than the specified places will lead to disqualification of the candidate.
7. Candidates shall maintain silence inside and outside the examination hall. If candidates are found violating the instructions mentioned herein or announced in the examination hall, they will be summarily disqualified from the entrance test.
8. In case of any dispute, the decision of the Entrance Test Committee shall be final and binding.
9. The OMR Answer Sheet consists of two copies, the Original copy and the Student's copy.

1	Identify the type of clause in the following sentence: "Having finished her homework, she went to bed early."				
	a) Finite clause	b) Non-finite clause	c) Independent clause	d) Dependent clause	b
2	Choose the correct sentence in indirect speech for the given sentence in direct speech: She said, 'I will come to the party.'				
	a) She said that she would come to the party.	b) She says that she will come to the party.	c) She said that she will come to the party.	d) She says that she would come to the party.	a
3	Parts of the following sentence have been jumbled. These parts have been labelled as P, Q, R and S. Re-arrange the jumbled parts of the sentence and mark your response. that carries them(P) / the first hurdle (Q) / is finding a vendor (R) / in shopping for big and tall sizes (S) /				
	a) PQRS	b) SRPQ	c) QSRP	d) PSQR	c
4	Identify the qualifier in the following sentence: She was quite happy with the results.				
	a) She	b) was	c) quite	d) happy	c
5	Select the appropriate modal verb to complete the sentence: Students ________ wear the school uniform at all times.				
	a) can	b) must	c) should	d) may	b
6	Every year March 8 is celebrated as				
	a) International Women's Day	b) Women Science Day	c) International Mother's Day	d)World Health Day	**a**
7	National Mathematics Day is celebrated to commemorate the birth anniversary of which of the following anniversary?				
	a) Sakuntala Devi	b) Brahmagupta	c) C. V. Raman	d)Srinivasa Ramanujan	**d**
8	Fields Medal is associated with which of the following subjects?				
	a) Mathematics	b) Philosophy	c) Chemistry	d) Geography	**a**
9	Aditi Gopichand Swamy is associated with which sports?				
	a) Swimming	b) Chess	c) Archery	d) Squash	**c**
10	**Halwa Ceremony** is related to which of the following?				
	a) Union Budget	b) Tourism	c) Midday Meal in School	d) Economic Survey	**a**
11	First lady field medalist is				
	a)Mary Cartwright	b)Emmy Noether	c)Maryam Mirzakhani	d)Julia Robinson	c
12	Who among the following was the first-ever badminton player from India to clinch an Olympic medal?				
	a) Srikant Kidambi	b) Saina Nehwal	c) Chirag Setty	d) PV Sindhu	b

13	Which communication technology allows information to be transmitted wirelessly over short distances?				
	a) Bluetooth	b) Microwave	c) Fiber optic	d) Satellite	a
14	Plague is				
	a) Viral disease	b) Fungal disease	c) Bacterial disease	d) Mineral disease	c
15	Which festival do Sikhs celebrates in the form of "Bandi Chhor"				
	a) Visakhi	b) Diwali	c) Gurpurab	d) Holi	b
16	The synonym of **COMPETENCE** is				
	a) ability	b) compensation	c) efficiency	d) competition	**a**
17	The phrase which is closely the same in meaning to the idiom ***To fly off the handle*** is				
	a) to dislocate	b) to lose one' temper	c) to take off	d) to be airborne.	**b**
18	Transformer is device to convert				
	a) Direct current to alternating current.	b)low voltage to high voltage	c) electrical energy to mechanical energy	d)mechanical energy to electrical energy.	**b**
19	Forty students competed _________ one another ________ a single scholarship.				**Answer**
	a) with; over	b) with; for	c) among; over	d) between; for	**b**
20	Give the full form of NIA				
	a)National Incubation Agency	b) Navel Investigation Agency	c) New Investigation Agency	d) National Investigation Agency	d
21	If u is a homogeneous function of order n in x and y, then $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x dy} + y^2 \frac{\partial^2 u}{\partial y^2} =$				
	a) nu	b) $n(n+1)u$	c) $n(n-1)u$	d) $n^2 u$	c
22	Consider the statements: A. $\sum \frac{n}{n+1}$ is not convergent. B. If the series $\sum \frac{n}{n+1}$ converges then $\lim_{n\to\infty} (\frac{n}{n+1}) = 0$.				
	a) Both A and B are true and B is the correct explanation for A.	b) Both A and B are true and B is not a correct explanation for A.	c) A is true but B is false.	d) A is false but B is true.	a
23	The set on which the function $f(x) = [x]$ ([.] denotes greatest integer function) is discontinuous is				

	a) Set of all rational numbers.	b) Set of all irrational numbers.	c) Set of all integral numbers.	d) Set of all prime numbers.	c
24	The function $f(x) = \lvert x \rvert$ at $x = 0$ is				
	a) continuous and differentiable.	b) continuous but not differentiable.	c) differentiable but not continuous.	d) neither continuous nor differentiable.	b
25	If the tangent to the curve $y = x^2$ at any point $(c, y(c))$ is parallel to the line joining $(a, y(a))$ and $\big(b, y(b)\big)$, then				
	a) a, c, b do not follow definite sequence.	b) a, c, b are in geometric progression.	c) a, c, b are in hyper geometric progression.	d) a, c, b are in arithmetic progression.	d
26	Which of the following statements is true? A. A function which is not continuous at a point may be differentiable at that point. B. Divergent sequence is not bounded. C. Bounded sequence is always convergent. D. Least upper bound of a bounded set is an element of the set.				
	a) A only.	b) B only.	c) A and B	d) B and C.	b
27	If the sequence (a_n) converges to a point a, then				
	a)$(\lvert a_n \rvert \pm a) \to 0$.	b) $\lvert a \rvert \lvert a_n \rvert \to 0$.	c) $\lvert a_n \rvert \to \lvert a \rvert$.	d) $\frac{\lvert a_n \rvert}{\lvert a \rvert} \to 0$.	c
28	The number of limit points for the sequence (n^2) is				
	a) 0	b) 1	c) 2	d) infinite.	a
29	Which of the following is continuous at the origin?				
	a) $f(x,y) = \begin{cases} \frac{1}{x^2+y^2}, & (x,y) \neq (\\ 0, & (x,y) = (0, \end{cases}$	b) $f(x,y) = \begin{cases} \frac{xy}{\sqrt{x^2+y^2}}, & (x,y) \neq \\ 0, & (x,y) = (0 \end{cases}$	c) $f(x,y) = \begin{cases} \frac{x^4-y^4}{x^4+y^4}, & (x,y) \neq (\\ 0, & (x,y) = (0, \end{cases}$	d) $f(x,y) = \begin{cases} \frac{x^2y^2}{x^4+y^4}, & (x,y) \neq (\\ 0, & (x,y) = (0, \end{cases}$	b
30	The series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ converges if				
	a) $p > 1$	b) $p < 1$	c) $0 < p \leq 1$	d) $p = 1$	a
31	If A linear transformation $T: V \to W$ is invertible, then				
	a) $Ta = Tb$ if $a \neq b$	b) $Ta = Tb$ iff $a \neq b$	c) $Ta = Tb$ if $TT^{-1}a \neq a$	d) $a = b$ if $Ta = Tb$	d
32	Let I be an identity transformation defined on a finite dimensional vector space V, then null space of I is				
	a) V	b) $\{0\}$	c) empty set	d) nonempty set with at least two members	b
33	The set M of square matrices of order n, with respect to matrix multiplication is				
	a) group.	b) monoid.	c) semi group.	d) quasi group.	b
34	Let T be an identity transformation defined on a finite dimensional vector space V, then				
	a) $Rank\ T = nullity\ of\ T$	b) $Rank\ T > \dim V$	c) $Rank\ T < dim\ V$	d) $Rank\ T = \dim V$	d
35	The radius of convergence for the power series $\sum \frac{(-1)^{n+1}(x-1)^n}{n}$ is				
	a) 1	b) -1	c) 0	d) 2	a

36	Let G and G' be group of integers under addition and group of integers under addition modulo n. If $\phi: G \to G'$ is defined as $\phi(x) = remainder\ of\ x\ on\ division\ by\ n$, then				
	a) ϕ is a homomorphism from G onto G'.	b) ϕ is not a homomorphism from G onto G'.	c) ϕ is a homomorphism from G into G'.	d) ϕ is not a homomorphism from G into G'.	c
37	The value of the integral $\int_0^1 te^{-t^2} dt$				**Answers**
	a) $\frac{1}{2e}$	b) $\frac{e}{2}$	c) $e - \frac{1}{2e}$	d) $\frac{e-1}{2e}$	**d**
38	The value of $\int \frac{f'(x)}{f(x)}\, dx$ is				
	a) $\log\lvert f(x)\rvert + c$	b) $\log f(x) + c$	c) $f(x) + c$	d) $\log\,(-f(x)) + c$	**a**
39	If $I_{m,n} = \int_0^{\pi/2} \sin^{\mathrm{m}} x \cos^{\mathrm{n}} x\, dx$, then				
	a) $I_{m,n} = \left(\frac{\pi}{2}\right) I_{n,m}$	b) $I_{m,n} = I_{n,m}$	c) $I_{m,n} = -I_{n,m}$	d) $I_{m,n} \neq I_{n,m}$	**b**
40	The area bounded by the parabola $y^2 = 4ax$ and its latus rectum is				
	a) $4a^2/3$ sq. units	b) $2\sqrt{2}a^2/3$ sq. units	c) $8a^2/3$ sq. units	d) $4a^2$ sq. units	**c**
41	Which of the following is not a property of double integral?				
	a)linearity	b) commutativity	c) area property	d) additivity	**b**
42	If D consists of all the points (x, y) satisfying $-1 \le x \le 1$ and $-x^2 \le y \le x^2$, then $\iint_D (x^4 - 2y)\, dydx$ is				
	a) $1/7$	b) $2/7$	c) $3/7$	d) $4/7$	**d**
43	If $F(x) = \int_e^x \log t\, dt$, for all positive x, then for any constant A,				
	a) $F'(x) = \log x + A$	b) $F'(x) = \log x - A$	c) $F'(x) = \log x$	d) $F'(x)$ cannot be obtained.	**c**
44	If $f(x + a) = f(x)$, then $\int_0^{na} f(x)dx$ is equal to				
	a) $\int_0^a f(nx)dx$	b) $\frac{1}{n}\int_0^a f(x)dx$	c) $n\int_0^a f(x)dx$	d) $n + \int_0^a f(x)dx$	**c**
45	The area bounded by the curve $y = x^2$, the x-axis and the lines $x = 1$ and $x = 3$ is				
	a) $20/3$	b) $27/3$	c) $25/3$	d) $26/3$	**d**
46	The value of the triple integral $\int_0^1 \int_0^1 \int_0^1 x\, dxdydz$ is				
	a) 1	b) $1/2$	c) $1/3$	d) $1/4$	**b**
47	Let C be the arc of the circle $\lvert z\rvert = 2$ from $z = 2$ to $z = 2i$ that lies in the first quadrant. Then $\left\lvert \int_C \frac{z+4}{z^3-1} dz \right\rvert$ is				
	a) $\le 6\pi$	b) $\le 2\pi/3$	c) $\le 24\pi/7$	d) $\le 6\pi/7$	**d**
48	Let γ be positively oriented circle $\lvert z\rvert = 1$. Then $\int_\gamma \frac{2\mathrm{Re}(z)}{z+2} dz$ is				
	a) 0	b) $2\pi i$	c) $-8\pi i$	d) $4\pi i$	**a**
49	If v is the imaginary part of an analytic function F, then an analytic function with real part v is given by:				
	a) $1/F$	b) iF	c) $-1/F$	d) $-iF$	b
50	If R is the radius of convergence of the power series $\sum a_n z^k$, then the radius of convergence of the power series $\sum k a_n z^{k-1}$ is				
	a) kR	b) R/k	c) R	d) $(k-1)R$	**c**

51	Let z_1 and z_2 be two non-zero complex numbers such that $\lvert z_1\rvert = \lvert z_2\rvert$ and $\arg z_1 + \arg z_2 = \pi$. Then z_1 is				
	a) z_2	b) $-z_2$	c) $\overline{z_2}$	d) $-\overline{z_2}$	**d**
52	If $f(x)+f(-x)=0$, then $\int_a^x f(t)dt$ is				
	a) an even function	b) an odd function	c) a periodic function	d) an oscillatory function.	**a**
53	If $G(x)=\int_1^{\sqrt{x}} \sin t\, dt$, then $G'(x)$ is				
	a) $\frac{\sin x}{2x}$	b) $\frac{\sin\sqrt{x}}{2x}$	c) $\frac{\sin\sqrt{x}}{2\sqrt{x}}$	d) $\frac{\sin\sqrt{x}}{\sqrt{2x}}$	**c**
54	The function $f(z)=xy+iy$ is				
	a) continuous everywhere and also is analytic.	b) discontinuous but analytic everywhere.	c) continuous everywhere but not analytic.	d) neither continuous nor analytic anywhere.	**c**
55	If $z=x+iy$ and $f(z)=u(x,y)+iv(x,y)$, then				
	a) both u and v are harmonic.	b) neither u nor v is harmonic	c) u is harmonic but v is not.	d) v is harmonic but not u.	**a**
56	If C is the circle $\lvert z\rvert = 2$ in positive sense, then $\int_c \frac{z}{(9-z^2)(z+i)}dz$ is equal to				
	a) $\pi i/10$	b) $\pi/5$	c) $\pi i/5$	d) $\pi/10$	**b**
57	The value of integral $\int \cos x \sin^5 x\, dx$ is				
	a) $\sin^6 x + c$	b) $\cos^6 x - c$	c) $\frac{1}{6}\sin^6 x + c$	d) $\frac{1}{6}\cos^6 x + c$	**c**
58	Which of the following statements on ordinary differential equations is/are true? A. The number of arbitrary constants is same as the degree of the differential equation. B. A linear differential equation can contain products of the dependent variable and its derivatives. C. A particular integral cannot contain arbitrary constants. D. By putting $\boldsymbol{v=y/x}$ any homogeneous first order differential equation transforms to variable separable form.				
	a) A and D are false	b) A and B are false	c) D is false	d) C is true	d
59	The ODE of the form $y'+Py=Qy^n, n\neq 1$is known as				
	a) Gaussian equation	b)Bassel's equation	c) Legendre's equation	d) Bernoulli's equation	d
60	Match the following:				

A. variable separable method	i. $\frac{\partial N}{\partial x}=\frac{\partial M}{\partial y}$	
B. $\frac{dy}{dx}+P\frac{dy}{dx}=Q$	ii.$\int f(x)dx=\int g(y)dy$	
C. $Mdx+Ndy=0$	iii. $Mdx+Ndy=du(x,y)$	
D. Perfect differential $Mdx+Ndy$	iv. $IF=e^{\int Pdx}$	

	a)A-iii, B-i, C-iv, D-ii	b)A-i, B-ii, C-iii, D-iv	c)A-ii, B-iv, C-i, D-iii	d)A-ii, B-i, C-iii, D-iv	c
61	What is the differential equation of all parabolas whose directrices are parallel to the x-axis? A: $d^3y/dx^3=0$ B: $d^3y/(dx^3+d^2y/dx^2)$				

	C: $d^3x/dy^3 = 0$ D: $d^2y/dx^2 = 0$				
	a) A is true	b) B is true	c) C is true	d) D is true	a
62	Which one of the following is correct if we differentiate the equation $xy = ae^x + be^{-x}$ two times?				
	a) $x(d^2y/dx^2) + 2(dy/dx) = xy$	b) $x(d^2y/dx^2) - 2(dy/dx) = xy$	c) $3x(d^2y/dx^2) + 2(dy/dx) = xy$	d) $x(d^2y/dx^2) + 2(dy/dx) = 2xy$	a
63	Find the general solution of $\left(xy\frac{dy}{dx} - 1\right) = 0$				
	a) $xy = logx + c$	b) $\frac{x^2}{2} = logy + c$	c) $\frac{y^2}{2} = logx + c$	d) $xy = c$	c
64	The integrating factor of the differential equation $y \log y\, dx + (x - \log y)dy = 0$ is				
	a) $\log x$	b) $\log y$	c) $\log(\log x)$	d) $\log(\log y)$	b
65	The order of a differential equation whose general solution is y=A sin$x$+B cos$x$ is				
	a) 4	b) 2	c) 0	d) 3	b
66	The differential equation is $y' + y\tan x = \cos(x), y(0) = 0$. The value of $y(\pi)$ is				**Answer option**
	a) π	b) $-\pi$	c) 2π	d) -2π	b
67	The solution of the differential equation $y = px + \sqrt{4 + p^2}$ is				
	a) $(y - Cx)^2 + C^2 = 0$	b) $(y - Cx)^2 + 4C^2 = 0$	c) $(y - Cx)^2 - C^2 = 4$	d) $(y - Cx)^2 - 4C^2 = 0$	c
68	The orthogonal trajectories of the rectangular hyperbola $xy = a^2$ is				
	a) $x^2 - y^2 = c^2$	b) $x^2 + y^2 = c^2$	c) $x^2 - y^2 = 0$	d) $x^2 + y^2 = 0$	a
69	If $f(D)y = e^{100x}V(x),\ where\ D \equiv \frac{d}{dx},$ then particular integral is.				
	a) $e^{100x}\frac{1}{f(D+100)}V(x$	b) $e^{200x}\frac{1}{f(D+200)}$	c) $e^{-100x}\frac{1}{f(D-100}$	d) $e^{-200x}\frac{1}{f(D-200}$	a
70	The function $f(x,y) = x^3 + xy^2 + 901$of the differential equation $\frac{dy}{dx} = f(x,y)$ does not satisfies the Euler's theorem as it is A: Homogeneous B: Non-Homogeneous C: Linear D: Bessel				
	a) A is true	b) D is true	c) C is true	d) B is true	d
71	The solution of $y' - y'' = 2x$ is A: $y = x^2 + 2x + 2$ B: $y = x^2 + 2x + 1$ C: $y = x + 2$ D: $y = x^2 - 2x + 1$ Choose the correct answer from the options given below:				
	a) A and B only	b) B only	c) C only	d) A and D only	a

72	The value of m for which the vectors $2\hat{\imath}-\hat{\jmath}+\hat{k},\ \hat{\imath}+2\hat{\jmath}-3\hat{k}$ and $3\hat{\imath}+m\hat{\jmath}+5\hat{k}$ may be coplanar is:				(b)
	a) 4	b)-4	c)5	d) -5	
73	The value of $\hat{\imath}\times(\vec{A}\times\hat{\imath})+\hat{\jmath}\times(\vec{A}\times\hat{\jmath})+\hat{k}\times(\vec{A}\times\hat{k})$ is equal to				(c)
	a) 0	b) $\vec{A}$	c)$2\vec{A}$	d)$3\vec{A}$	
74	If $\vec{A}$ and $\vec{B}$ are constant vectors, λ is a constant and $\vec{r}$ is a vector function of scalar variable t given by $\vec{r}=\vec{A}\cos\lambda t+\vec{B}\sin\lambda t$, then $\vec{r}\times\frac{d\vec{r}}{dt}$ is equal to				(d)
	a) $\vec{A}\times\vec{B}$	b) 0	c) $-\lambda^2(\vec{A}\times\vec{B})$	d)$\lambda(\vec{A}\times\vec{B})$	
75	A particle moves along the curve $x=2t^2, y=t^2-4t, z=3t-5$, where t is the time. The component of velocity at $t=1$ in the direction $\hat{\imath}-3\hat{\jmath}+2\hat{k}$ is given by				(c)
	a) $\sqrt{14}$	b) $\frac{1}{7}\sqrt{14}$	c) $\frac{8}{7}\sqrt{14}$	d) $\frac{10}{7}\sqrt{14}$	
76	If a vector function $\vec{A}$ of scalar variable t has a fixed direction, then $\left\lvert\vec{A}\times\frac{d\vec{A}}{dt}\right\rvert$ is equal to				(b)
	a)$2\vec{A}$	b) zero	c)non-zero	d) $2\,\frac{d\vec{A}}{dt}$	
77	If $\phi(x,y,z)=xy^2z$ and $\vec{A}=xz\hat{\imath}-xy^2\hat{\jmath}+yz^2\hat{k}$, then the value of $\frac{\partial^3(\phi\vec{A})}{\partial x^2\partial z}$ at $(2,-1,1)$ is				(b)
	a) $4\hat{\imath}+2\hat{\jmath}$	b)$4\hat{\imath}-2\hat{\jmath}$	c)$4\hat{\imath}+3\hat{\jmath}$	d)$4\hat{\imath}-3\hat{\jmath}$	
78	Let $\vec{r}$ be the position vector of a point and $\vec{A}$ is a constant vector, then the value of $grad\ (\vec{A}\cdot\vec{r})$ is equal to				a)
	a)$-\vec{A}$	b)$\vec{A}$	c)0	d)$2\vec{A}$	
79	Let $\vec{r}$ be the position vector of a point and $\vec{A}$ is a constant vector, then the value of $curl\ \{\vec{r}\times(\vec{A}\times\vec{r})\}$ is equal to				(d)
	a) $\vec{A}\times\vec{r}$	b) zero	c) $-\vec{A}\times\vec{r}$	d) $3\vec{r}\times\vec{A}$	
80	The directional derivative of x^2+y^2+4xz at $(1,-2,2)$ in the direction of the vector $2\hat{\imath}-2\hat{\jmath}-\hat{k}$ is				(c)
	a) – 8	b) 9	c) 8	d)-9	
81	The value of $\int_C\vec{F}.d\vec{r}$, where $\vec{F}=(y^2)\hat{\imath}+(x^2)\hat{\jmath}-(x+z)z^2\hat{k}$ and C is the boundary of the triangle with vertices (0,0,0), (1,0,0) and (1,1,0), is				(a)
	a) $\frac{1}{3}$	b) $-\frac{1}{3}$	c) $\frac{1}{4}$	d) $-\frac{1}{4}$	
82	Which of the following identity is not true?				

	a)$\vec{\nabla}(\vec{u}+\vec{v}) = \vec{\nabla}(\vec{u}) + \vec{\nabla}(\vec{v})$	b) $\vec{\nabla}(\vec{u}\vec{v}) = \vec{\nabla}(\vec{u})\vec{v} + u\vec{\nabla}(\vec{u})$	c) $\vec{\nabla}(\vec{u}\vec{v}) = \vec{\nabla}(\vec{u})\vec{v} + u\vec{\nabla}(\vec{v})$	d) $\vec{\nabla}(f(\vec{r})) = f'(\vec{r})\vec{\nabla}(\vec{r})$	(b)
83	If $u = x^2 + y^2 + z^2$ and $\vec{v} = x\,\hat{\imath} + y\,\hat{\jmath} + z\,\hat{k}$, then the value of $div(u\,\vec{v})$ is				
	a) $6u$	b) $-6u$	c) $5u$	d) $-5u$	(c)
84	The value of the integral $\int_C \hat{n}\,.\,d\vec{r}$, where $\hat{n}$ is unit tangent vector and C is circle $x^2 + y^2 = a^2$ is				(c)
	a)$4\pi a$	b) πa	c)$2\pi a$	d) $3\pi a$	
85	Let $\vec{r}$ be the position vector of a point, and $\vec{A}$ and $\vec{B}$ are constant vectors, then the value of $div[(\vec{r} \times \vec{A}) \times \vec{B}]$ is equal to				
	a)$\vec{A} \cdot \vec{B}$	b)$-\vec{A} \cdot \vec{B}$	c)0	d)$2\vec{A} \cdot \vec{B}$	(d)
86	The vector quantity $\vec{\nabla}(U^2)$ is equal to				
	a)$2\vec{\nabla} \times \vec{U}$	b)zero	c) $2(U\,\cdot)\vec{U} - 2\vec{U} \times curl\,\vec{U}$	d)$2(\vec{U}\cdot\vec{\nabla})\vec{U} + 2\vec{U} \times curl\,\vec{U}$	(d)
87	The equation of tangent plane to surface $xyz = 4$ at the point (1,2,2) is				
	a) $2x + y + z - 6 = 0$	b)$2x - y + z - 6 = 0$	c)$2x + y - z - 6 = 0$	d)$x + y + z - 6 = 0$	(a)
88	The number of basic feasible solutions of the system of linear equations : x + y + 2z = 9 and 3x + 2y + 5z = 22 (x, y, z ≥ 0) is				
	a) 3	b) 2	c) 1	d) 0	(b)
89	In a given linear programing problem (LPP), which of the following is true? (A) If the primal LPP has an unbounded objective function, then dual is infeasible. (B) The dual of the dual is primal (C) If the primal LPP has finite optimal solution, then dual LPP also has finite optimal solution. (D) If the primal LPP is infeasible, then the dual LPP must have unbounded objective function.				
	a). A and D	b) Only B	c) A and B	d). A, B and C	(d)
90	Which of the following set is not convex but closed set in R^2? A. X={(x, y)∈ R^2: y-3 ≥ $-x^2$, x, y ≥ 0} B. Y ={(x, y) ∈ R^2: x ≤ 5, y ≥ 3} C. Z ={(x,y) ∈ R^2:y^2≥ 4x} D. W = {(x,y) ∈ R^2: $2x^2$+ $3y^2$≤ 5}				
	a) A, B and C	b) only B	c)only C	d)B and D	(c)
91	**Assertion(A):**If X=(1,-2,3,4), Y=(-2,4,-1,-3) and Z=(-1,2,7,6) are three linearly dependent vectors, then Z-2Y-3X= **0** **Justification(B):** A set of vectors {X_i: i=1,2,…..,n} are linearly dependent iff $\sum_{i=1}^{n} a_i X_i = 0$ implies a_i = 0, ∀i Which of the following is correct?				
	a) B is true but A is false	b) Both A and B are false	c) A is true but B is false	d) Both A and B are true. B is the correct reasoning of A.	(c)

<table>
<tr><td>92</td><td colspan="4">Match the items of list-I with the items of list-II and indicate the code of correct matching:

<table><tr><td>Group-A</td><td>Group-B</td></tr><tr><td>(A). A straight line or hyperplane has</td><td>i. Convex polyhedron</td></tr><tr><td>(B). The set of all convex combinations of a finite number of points is called</td><td>ii. Extreme point</td></tr><tr><td>(C). If a point of a convex set X cannot be expressed as a convex combination of two other points in X is called</td><td>iii. Convex set with no extreme point</td></tr><tr><td>(D).Every hyperplane is</td><td>iv. No extreme point</td></tr></table></td><td></td></tr>
<tr><td></td><td>a) A→(iv), B→(i) ,C→(ii) ,D→(iii)</td><td>b) A→(i), B→(iii),C→(ii), D→(iv)</td><td>c) A→(iv), B→(ii),C→(i),D →(iii)</td><td>d) A→(i), B→(ii) ,C→(iii) ,D→(iv)</td><td>(a)</td></tr>
<tr><td>93</td><td colspan="4">For the linear system $x_1+x_2-x_3-2x_4-5x_5= 2$, $x_2+x_3+5x_4-5x_5=2$, the solution $x_1=x_3=x_4=0$, $x_2=7,x_5=1$ is</td><td></td></tr>
<tr><td></td><td>a) not a basic solution</td><td>b) abasic feasible solution</td><td>c) a basic solution</td><td>d) none of the above</td><td>(a)</td></tr>
<tr><td>94</td><td colspan="4">Consider the LPP: Minimize z = cx + 8y
subject to $2x + 5y \leq 20$, $x + 2y \leq 10$, $x \geq 0$, $y \geq 0$. Then this problem has an optimal solution</td><td></td></tr>
<tr><td></td><td>a) for some real values of c</td><td>b) for all positive real values of c</td><td>c) for all negative real values of c</td><td>d)for all real values of c</td><td>(d)</td></tr>
<tr><td>95</td><td colspan="4">Suppose that u and v are two different non-degenerate basic feasible solutions to a LPP. Which of the following is (are) correct statement (s)?
A. $\frac{1}{2}u+\frac{1}{2}v$ is a basic solution
B. $\frac{1}{2}u+\frac{1}{2}v$ is a feasible solution
C. $\frac{1}{2}u+\frac{1}{2}v$ is a basic feasible solution
D. $\frac{1}{2}u+\frac{1}{2}v$ is neither a basic nor a feasible solution.</td><td></td></tr>
<tr><td></td><td>a) $Only\ A$</td><td>b) Only B</td><td>c) A,B and C</td><td>d) Only D</td><td>(b)</td></tr>
<tr><td>96</td><td colspan="4">Which of the following statements is correct?
(A) Every LPP admits an optimal solution
(B) Every LPP admits a unique optimal solution
(C) If an LPP admits two optimal solutions, it has an infinite number of optimal solutions
(D) The set of all feasible solutions to an LPP is not a convex set</td><td></td></tr>
<tr><td></td><td>a) only (C)</td><td>b) only (A)</td><td>c) (A), (C) and (D)</td><td>d) None of the above</td><td>(a)</td></tr>
<tr><td>97</td><td colspan="4">In the simplex method, the starting solution of an LPP must be
A. Optimal and feasible
B. Non-optimal and feasible
C. Optimal and infeasible
D. Non-optimal and infeasible</td><td></td></tr>
<tr><td></td><td>a) Only A is true</td><td>b) Only B is true</td><td>c) Only C is true</td><td>d) Only D is true</td><td>(b)</td></tr>
<tr><td>98</td><td colspan="4">Consider the LPP: Maximize (z) = x + 1.5y</td><td></td></tr>
</table>

	subject to $2x + 3y \leq 16$, $x + 4y \leq 18$, $x \geq 0$, $y \geq 0$. If S denotes the set of all solutions of the above problem, then which is correct?				
	a) S is null set	b) S is a singleton set	c)S is a line segment	d) S has positive area	(c)
99	The principal argument of $z = -\frac{2}{1+i\sqrt{3}}$ is				
	a) $\pi/3$	b) $2\pi/3$	c) π	d) $4\pi/3$	**b**
100	Choose the correct answer from the true and false statements: A. $y = mx$ is the solution of $\frac{dy}{dx} = x$ B. $x^2 + y^2 = a^2$ is the solution of $\frac{dy}{dx} = -\frac{x}{y}$ C. $y^2 = 4ax + C$ is the solution of $\frac{dy}{dx} = \frac{2a}{y}$ D. $y = x$ is the solution of $\frac{dy}{dx} = 0$				
	a) B and C are true	b) A and B are false	c) C is not true	d) A is true	a