

Test Booklet No. _____

This booklet consists of 100 questions and 16 printed pages.

RGUCET/2025/28

Series

A

RGUCET 2025
Common Entrance Test, 2025
MASTER OF SCIENCE IN MATHEMATICS

Full Marks: 100

Time: 2 Hours

Roll No.

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Day and Date of Examination: _____

Signature of Invigilator(s) _____

Signature of Candidate _____

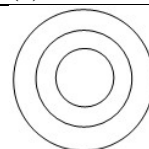
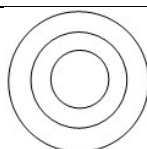
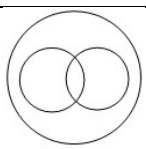
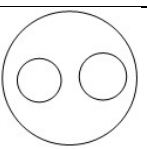
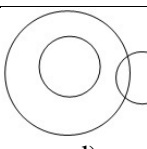
General Instructions:

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 before completion of Examination.
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	Arrange the following parts to form a coherent sentence: P. in the Himalayas Q. during winter R. heavy snowfall is common S. especially above 5000 metres				Answer								
	a)R Q S P	b)Q R S P	c)R S Q P	d)R P Q S	(d)								
2	Choose the correct indirect form of the sentence: 'She said, "I have finished my homework."'				Answer								
	a)She said she finished her homework.	b)She said that she had finished her homework.	c) She said that she has finished her homework.	d)She said that I had finished my homework.	(b)								
3	Choose the word opposite in meaning to “mitigate”:				Answer								
	a) Complicate	b) Worsen	c) Aggravate	d) Pacify	c								
4	Choose the correct option for the given statements A and R. Assertion (A): Modals are used to express necessity, ability, permission, or possibility. Reason (R): “Can”, “may”, and “must” are examples of determiners.				Answer								
	a) Both A and R are true, and R is the correct explanation of A	b) Both A and R are true, but R is not the correct explanation of A.	c) A is true but R is false.	d) A is false but R is true.	(c)								
5	Type Questions here for matching pairs: <table><tr><td>A. Must</td><td>i. Ability</td></tr><tr><td>B. Can</td><td>ii.Suggestion</td></tr><tr><td>C. Should</td><td>iii. Necessity</td></tr><tr><td>D. May</td><td>iv. Permission</td></tr></table>				A. Must	i. Ability	B. Can	ii.Suggestion	C. Should	iii. Necessity	D. May	iv. Permission	Answer
A. Must	i. Ability												
B. Can	ii.Suggestion												
C. Should	iii. Necessity												
D. May	iv. Permission												
	a) A-III, B-I, C-II, D-IV	b) A-II, B-I, C-III, D-IV	c) A-I, B-II, C-IV, D-III	d) A-IV, B-III, C-II, D-I	(a)								
6	Choose the correct sentence using a degree adverb:				Answer								
	a) She runs quite fast.	b) He should eats more.	c) They very enjoy music.	d) We must to leave now.	(a)								

7	Match the following pairs based on similar meaning:				A-iii, B-iv, C-i, D-ii
A. Assiduous		i. Scent			
B. Redolence		ii. Palpable			
C. Cologne		iii. Operose			
D. Apparent		iv. Musk			
	a) A-iii, B-iv, C-i, D-ii	b) A-iv, B-iii, C-ii, D-i	c) A-i, B-iii, C-ii, D-iv	d) A-i, B-ii, C-iv, D-iii	a
8	The statements are: A: B. R. Gavai was appointed as the 52 nd Chief Justice of India (CJI). B: Rishabh Pant retired from international test cricket recently.				Answer
	a) both A and B are true	b) only B is true	c) only A is true	d) None of these	c
9	Match the following:				Answer
A) National Science Day		i) 21 st June			
B) National Mathematics Day		ii) 28 th February			
C) World Heritage Day		iii) 18 th April			
D) International Yoga Day		iv) 22 nd December			
	a) A-iii, B-ii, C- iv, D-i	b) A-ii, B-iv, C- iii, D-i	c) A-iv, B-iii, C- ii, D-i	d) A-ii, B-iii, C-iv, D-i	b
10	Assertion (A): The ICC men’s Cricket World Cup 2023 was won by India. Reason (R): India defeated England in the final match.				Both A and R are false
	a) Both A and R are true, and R is the correct explanation of A	b) Both A and R are true, but R is not the correct explanation of A	c) A is true, but R is false	d) Both A and R are false	d)
11	Match List I with List II and select the correct answer using the codes given below lists:				A-i, B-ii, C- iv, D-iii
List -I Monuments		List -II Builders			
A Ali Darwaja		(i) Alaudid in Khalji			
B Buland Darwaja		(ii) Akbar			
C Moti Masjid, Agra		(iii) Aurangzeb			
D Moti Masjid, Delhi		(iv) Shah Jahan			
	a)A-i, B-ii, C- iii, D-iv	b) A-i, B-ii, C- iv, D-iii	c) A-i, B-ii, C- iii, D-iv	d) A-ii, B-i, C-iii, D-iv	(b)
12	In the 2025 India-EU Summit, which key agreement was signed to enhance bilateral trade?				Answer

	a)India-EU Green Energy Pact	b)India-EU Digital Partnership Agreement	c)India-EU Free Trade Agreement (FTA)	d)India-EU Strategic Technology Alliance	C) India-EU Free Trade Agreement (FTA)
13	Which state government has proposed “No Helmet, no Fuel” policy to curb road accidents?				Uttar Pradesh
	a) Bihar	b) Jharkhand	c) Uttar Pradesh	d) Haryana	(c)
14	Identify the logical diagram that represents the correct relationship between: <i>Musicians, instrumentalists and guitarists.</i>				
	 a)	 b)	 c)	 d)	(a)
15	Given below are two statements; one labelled as Assertion (A) and other labelled as Justification (B): Assertion (A): Adding salt to water lowers its freezing point. Justification (B): Salt disrupts the formation of ice crystals in water. Choose the correct answer from the options given below:				Both A & B are true and B is the correct justification of A
	a) Both A & B are not true	b) Both A & B are true and B is the correct justification of A	c) A is true, but B is not true	d) Both A & B are true, but B is not the correct justification of A	(b)
16	Complete the analogy: Tree: Forest:: Star : ?				Galaxy
	a) Sky	b) Night	c) Galaxy	d) Moon	c
17	Which of the following statements about Arunachal Pradesh is correct? A. Arunachal Pradesh shares its international borders with Bhutan, China, and Nepal. B. The highest peak in Arunachal Pradesh is Mt. Kangto, which rises to over 7,000 meters. C. Arunachal Pradesh is the smallest state in Northeast India by area. D. The state receives less than 100 centimeters of rainfall annually.				B only
	a) A and B	b) A,B and C	c) A only	d) B only	d)
18	Questions for matching pairs: Maths-Number systems/Algebra				D-i, A-ii, C-iii, B-iv
	A. Mean	i) Middle value of a data set when arranged in order			
	B. Median	ii) Difference between highest and lowest values			
	C. Mode	iii) The value that occurs most frequently			
	D. Range	iv) Average of all values			
	a) D-i, A-ii,C-iii, B-iv	b) C-1, B-ii, A-iii, D-iv	c) A-i, D-ii, B-iii, C-iv	d) B-i, C-ii, D-iii, A-iv	a)

19	Relate the statements and conclusions Statements: 1. Some actors are singers. 2. All the singers are dancers. Conclusions: I. Some actors are dancers. II. No singer is actor.				Only conclusion I follows
	a) Only conclusion I follows	b) Only conclusion II follows	c) Neither I nor II follows	d) Both I and II follow	(a)
20	Assertion (A): Tides indicate the regular and periodic rise and fall in the sea level. Reason (R): Tides are caused by the gravitational pull of the moon and sea level.				Both A and R true and R is the correct explanation of A
	a) Both A and R true and R is the correct explanation of A	b) Both A and R true but R is not the correct explanation of A	c) A is true but R is false	d) A is false but R is true	a)
21	The differential equation of circles centered at origin (0, 0) is				Answer
	a) $y \frac{dy}{dx} + x = 0$	b) $x \frac{dy}{dx} + y = 0$	c) $y \frac{dy}{dx} - x = 0$	d) $x \frac{dy}{dx} - y = 0$	a
22	The degree of the ordinary differential equation $\left(\frac{d^2y}{dx^2}\right)^3 - 3xy\left(\frac{dy}{dx}\right)^4 + y = e^{4x}$ is				Answer
	a) 1	b) 2	c) 3	d) 4	c
23	Which of the following is true related to the ordinary differential equation $\frac{d^2y}{dx^2} = \left[1 + \left(\frac{dy}{dx}\right)^4\right]^{5/3}$?				Answer
	a) degree 4 and order 2	b) degree 2 and order 20/3.	c) degree 3 and order 20.	d) degree 3 and order 2.	d
24	The orthogonal trajectories of the family of curves $y = cx^2$ is				Answer
	a) $x^2 + \frac{y^2}{2} = c$	b) $\frac{x^2}{2} - y^2 = c^2$	c) $xy = c^2$	d) $x^2 + y^2 = cx$	a
25	Which of the following statement(s) are true about the method of variation parameters in solving ordinary differential equation? A. It can be used to solve linear non-homogeneous differential equations. B. It is used to find complementary function of the differential equation C. It is used to find particular integral of the differential equation. D. It cannot be used to solve linear non-homogeneous differential equations.				Answer

	a) A and C	b)A and B	c) B and C	d) only D	a
26	The solution of the ordinary differential equation $(e^y + 1) \cos x \, dx + e^y \sin x \, dy = 0$ is				Answer
	a) $\sin y (e^x + 1) = c$	b) $\sin x (e^y + 1) = c$	c) $\cos x (e^y + 1) = c$	d) $\cos x (e^y + 1) = c$	b
27	Let $F(x, y)$ be the integrating factor such that $F(x, y)(ydx - xdy) = 0$ is exact. Which of the following is not a suitable expression of $F(x, y)$?				Answer
	a) $1/x^2$	b) $1/xy$	c) $1/(x^2 + y^2)$	d) x^2	d
28	A first order ordinary differential equation $\frac{dy}{dx} = f(x, y)$ is said to be homogeneous if $f(x, y)$ is a homogeneous function of degree				Answer
	a) 0	b) 1	c)2	d) 3	a
29	For the non-exact differential equation $Mdx + Ndy = 0$, where M and N are homogeneous functions of x and y of same degree, the integrating factor is given by				Answer
	a) $\frac{1}{My+Nx}, My + Nx \neq 0$	b) $\frac{1}{Mx+Ny}, Mx + Ny \neq 0$	c) $\frac{1}{Mx-Ny}, Mx - Ny \neq 0$	d) $e^{\int p(x)dx}$, where $p(x) = \left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)/N$	b
30	What is the value of λ for which the differential equation $(xy^2 + \lambda x^2y)dx + (x + y)x^2dy = 0$ is exact?				Answer
	a) 1	b) 2	c)3	d) -1	c
31	The solution of the ordinary differential equation $(D^2 + 6D + 9)y = 2e^{-2x}$, where $D \equiv \frac{d}{dx}$, is				Answer
	a) $y = (c_1x + c_2x^2)e^{-3x} + 2e^{-2x}$	b) $y = (c_1 + c_2x)e^{-3x} + 2e^{-2x}$	c) $y = xe^{-3x} + 2e^{-2x}$	d) $y = (c_1 - c_2x)e^{3x} + 2e^{-2x}$	b
32	Which of the following complex function $f(z)$ is continuous at $z = 0$?				Answer
	a) $f(z) = z\text{Real}(z)/ z $ and $f(0) = 0$	b) $f(z) = \text{Real}(z)/ z $ and $f(0) = 1$	c) $f(z) = \text{Real}(z^2)/ z ^2$ and $f(0) = -1$	d) $f(z) = \bar{z}/z$ and $f(0) = 1/2$	a
33	Match the curve Γ with the value of the integral $\int_{\Gamma} \frac{dz}{1+z^2}$, and choose the correction answer:				Answer
Eqn. of curve (Γ)		Value of $\int_{\Gamma} \frac{dz}{1+z^2}$			
A. $\Gamma: z + i = 1$		i. 0			
B. $\Gamma: z - i = 1$		ii. π			
C. $\Gamma: z = 3$		iii. $-\pi$			
	a) $A - ii, B - i, C - iii$	b) $A - iii, B - ii, C - i$	c) $A - ii, B - iii, C - i$	d) $A - i, B - ii, C - iii$	b

34	Which of the following functions is not analytic?				Answer
	a) $f(z) = z ^2 + 1$	b) $f(z) = \frac{z+1}{z+4}, z \neq -4$	c) $f(z) = z^3 + 3i$	d) $f(z) = iz^3 + 3i$	a
35	Let C be the positively oriented unit circle $ z = 1$, then the value of $\int_C \frac{e^{2z}}{z^4} dz$ is				Answer
	a) $\frac{\pi i}{2}$	b) $8\pi i/3$	c) $2\pi i$	d) $4\pi i$	b
36	Choose the correct answer. A: The function $f(z) = \sqrt{ xy }$ is not analytic at $(0, 0)$. B: $f(z) = \sqrt{ xy }$ satisfies Cauchy-Riemann equations at $(0, 0)$.				Answer
	a) Both A and B are true.	b) Both A and B are false.	c) Only A is true.	d) Only B is true.	a
37	Match the power series with their domain of convergence, and choose the correct answer:				Answer
	A. $\sum_n \left(\frac{iz-1}{2+i}\right)^n$		i. $ z + 1 + i > 2$		
	B. $\sum_n \left(\frac{2i}{z+1+i}\right)^n$		ii. converges for only $z = 0$.		
	C. $\sum_n n! z^n$		iii. $ z + i < \sqrt{5}$		
	D. $\sum_n \frac{1}{(1+z^2)^n}$		iv. $ z^2 + 1 > 1$		
	a) $A - iii, B - i, C - ii, D - iv$	b) $A - iv, B - i, C - ii, D - iii$	c) $A - ii, B - i, C - iv, D - iii$	d) $A - ii, B - iv, C - ii, D - iii$	a
38	An entire function which is bounded in the whole complex plane is				Answer
	a) meromorphic	b) constant	c) discontinuous	d) not constant	b
39	Let C be the curve given by $z = 2e^{i\theta} \left(-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}\right)$. Then the value of the integral $\int_C \bar{z} dz$ is				Answer
	a) $\pi i/2$	b) πi	c) $3\pi i$	d) $4\pi i$	d
40	Let C be the semi-circle of the $z = e^{i\theta}, -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$, in the complex plane. Then the upper bound for $\left \int_C (x^2 + iy^2) dz\right $ is				Answer
	a) $-\pi$	b) $\pi/4$	c) $\pi/2$	d) π	d
41	Choose the correct statement:				Answer
	a) A simplex in two dimensions is a triangle.	b) A supporting hyperplane must be unique.	c) A function cannot be both convex and concave.	d) Every strictly convex function may be unique.	a
42	The set $S = \{(x, y): xy \geq 1; x \geq 0, y \geq 0\}$ is				Answer

	a) Concave	b) Convex	c) not convex	d) none of these	b								
43	Choose the correct statements: A. The set of all convex combinations of a finite number of points of $S \subset R^n$ is a convex set. B. Let S be a closed convex set which is bounded from below. Then S has extreme points in every supporting hyperplane. C. A simplex in $n -$ dimensional is a convex polyhedron having exactly $(n - 1)$ vertices. D. A physical model is an example of symbolic model.				Answer								
	a) C, D	b) A, B	c) A, C	d) A, B, C, D	b								
44	Given an LPP to maximize $z = -5y$ subject to $x + y \leq 1$, $0.5x + 5y \geq 0$, and $x \geq 0, y \geq 0$, then we have				Answer								
	a) Unique optimum solution	b) multiple optimum solutions	c) unbounded solution	d) no feasible solution	d								
45	Match the correct pairs: <table border="1"><tr><td>A. The set $S = \{(x, y): 3x^2 + 2y^2 \leq 6\}$ is</td><td>i. use of available resource</td></tr><tr><td>B. If a linear programming problem has a feasible solution, then</td><td>ii. convex</td></tr><tr><td>C. A constraint in an LPP restricts</td><td>iii. LPP has basic feasible solution</td></tr><tr><td>D. A simplex in two dimensions is</td><td>iv. a triangle</td></tr></table>				A. The set $S = \{(x, y): 3x^2 + 2y^2 \leq 6\}$ is	i. use of available resource	B. If a linear programming problem has a feasible solution, then	ii. convex	C. A constraint in an LPP restricts	iii. LPP has basic feasible solution	D. A simplex in two dimensions is	iv. a triangle	Answer
A. The set $S = \{(x, y): 3x^2 + 2y^2 \leq 6\}$ is	i. use of available resource												
B. If a linear programming problem has a feasible solution, then	ii. convex												
C. A constraint in an LPP restricts	iii. LPP has basic feasible solution												
D. A simplex in two dimensions is	iv. a triangle												
	a) A-ii, B-iii, C-i, D-iv	b)A-iii, B-ii, C-i, D-iv	c)A-i, B-iii, C-ii, D-iv	d)A-ii, B-ii, C-iii, D-iv	a								
46	When we solve a system of simultaneous linear equations by using Two-Phase Simplex Method, the values of decision variables may be				Answer								
	a) positive	b) zero	c)positive and/or negative	d) negative	c								
47	For the following LPP: Maximize: $z = 2x - 3y$ subject to the constraints $2x + 5y \geq 10$, $3x + 8y \leq 24$, $x \geq 0$ and, $y \geq 0$. Choose the correct statements. <table border="1"><tr><td>A. $x = 8, y = 0$</td></tr><tr><td>B. $x = 10, y = 1$</td></tr><tr><td>C. maximum is 17</td></tr><tr><td>D. maximum is16</td></tr></table>				A. $x = 8, y = 0$	B. $x = 10, y = 1$	C. maximum is 17	D. maximum is16	Answer				
A. $x = 8, y = 0$													
B. $x = 10, y = 1$													
C. maximum is 17													
D. maximum is16													
	a) only A	b) only C	c) A and C	d) A and D	d)								
48	For maximization LPP, the objective function coefficient for an artificial variable is				Answer								

	a) $+M$	b) $-M$	c) $+1$	d) zero	b								
49	Given a system of m simultaneous linear equations in n unknowns ($m < n$), the number of basic variables will be				Answer								
	a) m	b) n	c) $n - m$	d) $n + m$	a								
50	The solution of the following LPP is: Maximize $z = 2x + 3y$, subject to the constraints: $x + y \leq 30, x - y \geq 0, y \geq 3, 0 \leq x \leq 20$ and $0 \leq y \leq 12$.				Answer								
	a) $z = 70$	b) $z = 72$	c) $z = 69$	d) $z = 73$	b								
51	The least upper bound of the set $\{1/n, n \in \mathbb{N}\}$ is				Answer								
	a) 1	b) 0	c) -1	d) does not exist	(a)								
52	For the sequence $(a_n) = \langle -1, -2, -\frac{1}{3}, -3, -\frac{1}{5}, \dots \rangle$, limit inferior and limit superior, respectively, are				Answer								
	a) $-\infty$ and 0	b) $-\infty$ and -1	c) 0 and 0	d) $-\infty$ and ∞	(a)								
53	Which of the following statements is/are true? A. A sequence converges to l if and only if every subsequence of it converges to l . B. Every sequence has a convergent subsequence. C. A monotonic sequence is always convergent. D. Every convergent sequence is Cauchy.				Answer								
	a) A and D	b) A, B and C	c) A only	d) D only	d)								
54	Consider the sequence (a_n) , where $a_n = \frac{2n-7}{3n+2}$. Then A: (a_n) converges to $2/3$. B: (a_n) is monotonic increasing sequence.				Answer								
	a) A is true but B is false.	b) Both A and B are true and B is the justification for A.	c) Both A and B are true but B is not a justification for A.	d) Both A and B are false.	(c)								
55	Match the following sequences with the correct option: <table border="1"><tr><td>$A\left(\frac{(-1)^n}{n}\right)$</td><td>I Oscillates finitely</td></tr><tr><td>$B(1 + (-1)^n)$</td><td>II Converges.</td></tr><tr><td>$C((-1)^n n)$</td><td>III Diverges to $-\infty$</td></tr><tr><td>$D(-(e)^n)$</td><td>IV Oscillates infinitely</td></tr></table>				$A\left(\frac{(-1)^n}{n}\right)$	I Oscillates finitely	$B(1 + (-1)^n)$	II Converges.	$C((-1)^n n)$	III Diverges to $-\infty$	$D(-(e)^n)$	IV Oscillates infinitely	Answer
$A\left(\frac{(-1)^n}{n}\right)$	I Oscillates finitely												
$B(1 + (-1)^n)$	II Converges.												
$C((-1)^n n)$	III Diverges to $-\infty$												
$D(-(e)^n)$	IV Oscillates infinitely												
	a) A-I, B-III, C-II, D-IV	b) A-II, B-I, C-IV, D-III	c) A-II, B-IV, C-III, D-I	d) A-IV, B-III, C-I, D-II	(b)								
56	The given series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^p}, p > 0$ is				Answer								
	a) absolutely convergent if $p < 1$	b) conditionally convergent if $p > 1$	c) divergent.	d) absolutely convergent for $p > 1$	(d)								

57	Let (u_n) be a sequence such that $\lim_{n \rightarrow \infty} \frac{u_{n+1}}{u_n} = l$. Then				Answer								
	a) $\lim_{n \rightarrow \infty} u_n = 0$ if $ l < 1$	b) $\lim_{n \rightarrow \infty} u_n = 1$ if $ l > 0$	c) $\lim_{n \rightarrow \infty} u_n = 1$ if $ l = 1$	d) $\lim_{n \rightarrow \infty} u_n = 0$ if $ l > 1$	(a)								
58	Which of the following statements is/are true? A. Continuity is necessary and sufficient condition for the existence of a finite derivative. B. Bounded sequences are always convergent. C. If f is derivable at a point c , then $ f $ is also derivable at c , provided $f(c) \neq 0$.				Answer								
	a) A, B and C	b) A and C	c) A and B	d) C only	(d)								
59	Consider the series $\sum u_n = \sum_{n=1}^{\infty} \frac{1}{n^n}$ and $\sum v_n = \sum_{n=1}^{\infty} \frac{1}{2^n}$. Then A: $\sum u_n$ converges. B: $\sum v_n$ converges.				Answer								
	a) A is false but B is true	b) Both A and B are false.	c) Both A and B are true and B is a justification for A.	d) Both A and B are true but B is not a justification for A.	(c)								
60	Type Questions here for matching pairs: <table border="1"><tr><td>A. Value of $\frac{d^n}{dx^n} (ax + b)^n$ is</td><td>i. $(x \log x)^{-1}$</td></tr><tr><td>B. Value of $\frac{d}{dx} (\log x)$ is</td><td>ii. $(n - 1)!$</td></tr><tr><td>C. Differential coefficient of $f(\log x)$, where $f(x) = \log x$, is</td><td>iii. $1/x$</td></tr><tr><td>D. If $y = x^{n-1} \log x$, then $x \frac{d^n y}{dx^n} =$</td><td>iv. $n! a^n$</td></tr></table>				A. Value of $\frac{d^n}{dx^n} (ax + b)^n$ is	i. $(x \log x)^{-1}$	B. Value of $\frac{d}{dx} (\log x)$ is	ii. $(n - 1)!$	C. Differential coefficient of $f(\log x)$, where $f(x) = \log x$, is	iii. $1/x$	D. If $y = x^{n-1} \log x$, then $x \frac{d^n y}{dx^n} =$	iv. $n! a^n$	Answer
A. Value of $\frac{d^n}{dx^n} (ax + b)^n$ is	i. $(x \log x)^{-1}$												
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D. If $y = x^{n-1} \log x$, then $x \frac{d^n y}{dx^n} =$	iv. $n! a^n$												
	a) A-IV, B-I, C-III, D-II	b) A-IV, B-I, C-II, D-III	c) A-II, B-I, C-III, D-IV	d) A-IV, B-III, C-I, D-II	(d)								
61	Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be a constant function. Then image of \mathbb{R} under f is				Answer								
	a) open	b) infinite	c) empty	d) not open	(d)								
62	Which of the following is a decreasing sequence?				Answer								
	a) $(2 + 1/n)$	b) $(2 - 1/n)$	c) $a(1 - 1/n)$	d) $a(-1/n)$	(a)								

63	Which of the following statements is/are true? A. The subset of an open set is always open. B. Interior of any set is closed. C. Derived set of the set of all rationals is the set of rational numbers. D. A finite set is not dense in itself.				Answer
	a) B, C and D	b) C only	c) D only	d) B only	c)
64	Consider the statements and choose the correct statement. A: $S = [1,2] \cup (3,4) \cup \{5\}$ is not an open set. B: The set of limit points of S is $[1,2] \cup [3,4]$.				Answer
	a) A is true but B is false.	b) Both A and B are true and B is the justification for A.	c) Both A and B are true but B is not a justification for A.	d) Both A and B are false.	(b)
65	Which of the following function does not satisfies Rolle's theorem?				Answer
	a) $\sqrt{4-x^2}$ in $[-2,2]$	b) $ x-2 $ in $[1,3]$	c) $e^x \sin x$ on $[0,\pi]$	d) $x(x-3)^2$ on $[0,3]$	(b)
66	If $\int f(x) dx = g(x)$ and also $\int f(x) dx = h(x)$, then				Answer
	a) $h(x) + g(x) = \text{constant}$	b) $g(x) - h(x) = \text{constant}$	c) $h(x)g(x) = \text{constant}$	d) $h(x) = g(x)$	b
67	If n is an odd positive integer, then one of the values $\int x^n dx$ is equal to				Answer
	a) $\frac{ x^{n+1} }{n+1}$	b) $\frac{x^{n+1}}{n+1}$	c) $\frac{ x^n x}{n+1}$	d) None of these	c
68	The value of the integral $\int e^x [f(x) + f'(x)] dx$ is				Answer
	a) $e^x f(x) + c$	b) $-e^x f(x) + c$	c) $e^x + f(x) + c$	d) None of these	a
69	If $\int g(x) dx = f(x)$, then $\int f(x)g(x)dx$ is equal to				Answer
	a) $\log f(x) + c$	b) $\frac{1}{2}[g(x)]^2 + c$	c) $\frac{1}{2}[f(x)]^2 + c$	d) None of these	c
70	If $I_n = \int_0^{\pi/4} \tan^n x dx$, then the value of $I_{n+1} - I_{n-1}$ is				Answer
	a) $-\frac{1}{n}$	b) $\frac{1}{n}$	c) $\frac{2}{n}$	d) $-\frac{2}{n}$	b
71	$\int_0^a f(x)dx$ is equal to				Answer
	a) $\int_0^a f(-x) dx$	b) $\int_0^a f(a-x) dx$	c) $\int_0^a f(a+x) dx$	d) $\int_0^a f(2a-x) dx$	b
72	Evaluate $\int_0^1 \frac{\tan^{-1} x}{1+x^2} dx$				Answer

	a) $\frac{\pi^2}{4}$	b) $\frac{\pi^2}{8}$	c) $\frac{\pi^2}{16}$	d) $\frac{\pi^2}{32}$	d
73	The area of the circle $x^2 + y^2 = 16r^2$ is				Answer
	a) πr^2	b) $\frac{\pi r^2}{16}$	c) $\frac{\pi r^2}{4}$	d) $16\pi r^2$	d
74	The integral $\int_0^\pi f(\sin x) dx$ is equivalent to				Answer
	a) $2 \int_0^{\pi/2} f(\sin x) dx$	b) $\int_0^{\pi/2} f(\sin x) dx$	c) $2 \int_0^{\pi/2} f(\cos x) dx$	d) $\int_0^{\pi/2} f(\cos x) dx$	a
75	The area bounded by the curve $y = \varphi(x)$, the x -axis and the lines $x = a$ and $x = b$ ($a < b$) is given by				Answer
	a) $\int_a^b \int_0^{\varphi(x)} y dx dy$	b) $\int_a^b \int_0^{\varphi(x)} dx dy$	c) $2 \int_a^b \int_0^{\varphi(x)} dx dy$	d) 0	b
76	To change a given double integral from cartesian to polar coordinates; we use the formula				Answer
	a) $dx dy = dr d\theta$	b) $dx dy = r dr d\theta$	c) $dx dy = r^2 dr d\theta$	d) $r dx dy = d\theta dr$	b
77	The double integral $\int_0^1 \int_0^1 (x^2 + y^2) dx dy$ is equal to				Answer
	a) 0	b) 1	c) $\frac{1}{3}$	d) $\frac{2}{3}$	d
78	The volume of the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$, is				Answer
	a) $4\pi abc$	b) $\frac{4}{3}\pi abc$	c) $\frac{8}{3}\pi abc$	d) $8\pi abc$	b
79	The area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ is				Answer
	a) $\frac{1}{3}a^2$	b) $\frac{4}{3}a^2$	c) $\frac{16}{3}a^2$	d) $\frac{64}{3}a^2$	c
80	Evaluate $\int \int (x + y) dx dy$ over a region bounded by curves $xy = 6$ and $x + y = 7$.				Answer
	a) $\frac{5}{3}$	b) $\frac{25}{3}$	c) $\frac{125}{3}$	d) $\frac{625}{3}$	c

81	<p>Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason/Justification (R).</p> <p>Assertion(A): Let R be a commutative ring with unity and F be a field. If $f: R \rightarrow F$ be an epimorphism, then $\text{Ker}(f)$ is both prime and maximal ideal of R.</p> <p>Justification(R): If $f: R \rightarrow F$ be a homomorphism of rings, then</p> <p>(i) $\text{Ker}(f)$ is prime ideal if F is an integral domain,</p> <p>(ii) $\text{Ker}(f)$ is maximal ideal if f is surjective and F is a field.</p> <p>In the light of the above statements choose the correct answer from the options given below:</p>	Answer
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	a) A is false but R is true	b) Both A and R are false	c) A is true but R is false	d) Both A and R are true and R is the correct reasoning of A.	d
82	Let $f: (Q, +) \rightarrow (Q, +)$ be a non-zero group homomorphism. Then which of the followings is true? A. f is always one-one. B. f is always onto. C. f is always a bijection. D. f is neither one-one nor onto.				Answer
	a) Only A	b) Only B	c) A and B	d) A, B and C	d
83	The set of all algebraic numbers form				Answer
	a) Commutative ring	b) A field	c) A non-commutative ring	d) An integral domain	b
84	All possible units in the ring Z_8 of all integers modulo 8 is/are				Answer
	a) 1, 3, 5, 7	b) 3, 5, 7	c) 1, 2	d) 1, 3, 11	a
85	In the symmetric group S_5 if $\alpha = (123)(45)$ and $\beta = (23)(14)$, then the value of $\alpha\beta\alpha^{-1}$ is				Answer
	(a) (13)(245)	(b) (13)(25)(4)	(c) (12)(345)	(d) (12)(45)(3)	b
86	Which of the following(s) is/are true? (A) Every group of order 51 is cyclic. (B) Every group of order 151 is cyclic (C) Every group of order 505 is cyclic. (D) Every group of order 15 is cyclic.				Answer
	a) A and C	b) Only C	c) A, B and D	d) A, B and C	c
87	Let $f: G \rightarrow H$ be a group homomorphism defined by $f(x) = i^n \forall x \in G$, where, $i = \sqrt{-1}$, G is additive group of integers and H is a multiplicative group of fourth roots of unity, then which of the following is the $\text{Ker}(f)$? A. $\{2k + 1: k \in Z\}$ B. $\{k: k \in Z\}$ C. $\{4k: k \in Z\}$ D. Φ				Answer
	a) Only A	b) Only C	c) Only B	d) Only D	b
88	The set of integer modulo 7 is a				Answer
	a) Non-commutative ring without unity	b) Commutative ring without unity	c) Commutative ring with unity	d) Non-commutative ring with unity	c

89	Let V be the vector space of all real polynomials of degree at most 3. Define the linear transformation $T: V \rightarrow V$ by $Tp(x) = \frac{d}{dx}(p(x))$, then the matrix of T w.r.t the basis $\{1, x, x^2, x^3\}$ is given by				Answer
	(a) $\begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 3 \\ 0 & 0 & 0 & 0 \end{pmatrix}$	(b) $\begin{pmatrix} 1 & 1 & 2 & 0 \\ 0 & 2 & 2 & 0 \\ 0 & 0 & 3 & 3 \\ 0 & 0 & 0 & 4 \end{pmatrix}$	(c) $\begin{pmatrix} 0 & 1 & 0 & 1 \\ 0 & 2 & 2 & 0 \\ 0 & 0 & 3 & 3 \\ 0 & 0 & 0 & 1 \end{pmatrix}$	(d) $\begin{pmatrix} 1 & 1 & 0 & 2 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 1 \end{pmatrix}$	a
90	Suppose that A is a 5×5 non-zero real square matrix. Which of the following implication(s) is/are correct? A. $\text{Det}(A) = 0$ implies $\text{rank}(A) = 0$ B. $\text{Det}(A) = 1$ implies $\text{rank}(A) \neq 1$ C. $\text{rank}(A) = 1$ implies $\text{det}(A) \neq 0$ D. $\text{rank}(A) = 5$ implies $\text{det}(A) \neq 1$				Answer
	a) Only A	b) Only B	c) A,B and C	d) A and D	b
91	Let $V = R^{2025}$ and $W = R^{2026}$. Also let $T: V \rightarrow W$ be a linear map such that $N(T)$ and $R(T)$ denote nullity and range of T respectively, then $N(T) + R(T)$ is				Answer
	(a) 2026	(b) 2025×2026	(c) 2025	(d) 4051	c
92	The system of equations $x - y + 3z = 0, x + z = 0, x + y - z = 0$ has				Answer
	a) a unique solution	b) exactly two solutions	c) infinitely many solutions	d) no solution	c
93	Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason/Justification (R). Assertion (A): The vectors $(1,0,1)$, $(1,1,0)$ and (a,b,c) in R^3 are linearly dependent iff $a = b + c$. Justification (B): Three vectors (u,v,w) , (p,q,r) and (l,m,n) are linearly dependent iff $\begin{vmatrix} u & v & w \\ p & q & r \\ l & m & n \end{vmatrix} \neq 0$ In the light of the above statements choose the correct answer from the options given below:				Answer
	a) A is true but R is false	b) A is false and R is true	c) Both A and R are true and R is the correct explanation for A	d) Both A and R are true but R is not the correct explanation for A	a
94	If the four vectors $(1,1,0,0)$, $(1,0,0,1)$, $(1, 0, a, 0)$ and $(0, 1, a, b)$ in R^4 are linearly independent, then which of the following is/are true? (A) $a \neq 0, b \neq 2$ (B) $a \neq 2, b \neq 0$ (C) $a \neq 0, b \neq -2$ (D) $a \neq -2, b \neq 0$				Answer

	a) Only A	b) Only C	c) Only B	d) Only D	b
95*	Let W be a subspace of \mathbb{R}^4 defined as $W = \{(a, b, c, d): a + b = 0, c = 2d\}$, then which of the following is the basis of the solution space of W ? (A) $\{(1, 1, 0, 0), (0, 0, 1, 1)\}$ (B) $\{(-1, 1, 0, 0), (0, 0, 2, 1)\}$ (C) $\{(-1, 1, 0, 1), (0, -1, 2, 1)\}$ (D) $\{(-1, 1, -2, 2), (3, 0, 2, 1), (0, 1, 2, 3)\}$				Answer
	a) Only A	b) Only C	c) Only B	d) Only D	b

95*	If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ and $r = \vec{r} $, then match the following columns with correct code				Answer
A. $\text{grad}(r)$		i. 3			
B. $\text{grad}(r^n)$		ii. $\frac{\vec{r}}{ r }$			
C. $\text{div}(\vec{r})$		iii. 0			
D. $\text{curl}(\vec{r})$		iv. $nr^{n-2}.\vec{r}$			
	a) (A)-(ii), (B)-(iv), (C)-(i), (D)-(iii)	b) (A)-(iv), (B)-(i), (C)-(ii), (D)-(iii)	c)(A)-(i), (B)-(iv), (C)-(ii), (D)-(iii)	d)(A)-(iv), (B)-(i), (C)-(iii), (D)-(iv)	a
96	The directional derivative of $\phi = 4e^{2x-y+z}$, at the point (1,1,-1) in the direction towards the point (-3,5,6)				Answer
	a) $-\frac{2}{9}$	b) $\frac{10}{9}$	c) $\frac{20}{9}$	d) $-\frac{20}{9}$	d
97	Choose the False statement/statements: A. If \vec{F} is conservative force field, then it can be expressed as the gradient of some scalar function ϕ B. If \vec{F} is conservative, then \vec{F} is not necessarily irrotational. C. The divergence of the curl of any vector field is always zero. D. The vector field $\vec{F}=\nabla\times\vec{A}$ where \vec{A} is any vector field, is always solenoidal.				Answer
	a)A and B	b)Only B	c) A and C	d) only D	
98	Identify which of the following statement/statements are true : A. The surface integral of a vector field gives the total flux across the surface. B. A surface integral always results in a scalar quantity. C. Volume integrals can be used to calculate total mass when density is given as a function of position. D. A volume integral of a vector field always gives a vector.				Answer
	a)Only A	b)Both A and C	c)A,C and D	d)C and D	
99	According to Stoke's theorem, if S is an open surface bounded by a simple closed curve C and \vec{F} is continuous having continuous partial derivatives in S and C and \hat{n} is the outward unit normal vector and C is traversed in anti-clockwise direction, then				Answer
	a) $\int_C \vec{F} \cdot \vec{dr} = \iint_S \text{grad}\vec{F} \cdot \hat{n} ds$	b) $\int_C \vec{F} \cdot \vec{dr} = \iint_S \text{curl grad}\vec{F} \cdot \hat{n} ds$	c) $\int_C \vec{F} \cdot \vec{dr} = \iiint_S \text{div}\vec{F} \cdot \hat{n} ds$	d) $\int_C \vec{F} \cdot \vec{dr} = \iint_S \text{curl}\vec{F} \cdot \hat{n} ds$	

100	Identify which of the following statement/statements are true : A. The gradient of a scalar field is a vector field. B. The divergence of a vector field is always a vector quantity C. The curl of a vector field is a scalar field. D. If $\text{div } \vec{F} = 0$, \vec{F} must be conservative.				Answer
	a) Only A	b) Both B and D	c) A, C and D	d) Only D	a

* Q 95 twice : Forwarded for Grievance Committee Decision