opend Found Scaled and opend for evaluation Purpose on 5/7/16 at 12:32 Pm U ARE ASKEDTO DO SO) (DO NOT OPEN THIS QUESTION BOOKLE (PG-EE-2016) Maths, Math with Computer Science Code 11825 Sr. No. Total Questions: 100 Max. Marks: 100 Time: 11/4 Hours (in words) (in figure)_ Roll No. Pather's Name: Name: Date of Examination: Mother's Name : (Signature of the Invigilator) (Signature of the candidate) CANDIDATES MUST READ THE FOLLOWING INFORMATION/ INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER. All questions are compulsory. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated. 3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing within two hours after the test is over. No such complaint(s) will be entertained thereafter. 4 The candidate MUST NOT do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers MUST NOT be ticked in the Question book-let. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer. 6. Use only Black or Blue BALL POINT PEN of good quality in the OMR Answer-Sheet, BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LETS, COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE

EXAMINATION.

Question No.	Questions
1.	Every skew-symmetric matrix of odd order is (1) Symmetric (2) Singular (3) Non-singular (4) Hermitian
2.	If r is the rank of the matrix A, then the number of linearly independent solutions of the equation $AX = 0$ in n variables, is (1) $n-r$ (2) $n-r-1$ (3) $r-1$ (4) n/r
3.	For the equation $x^8 + 5x^3 + 2x - 3 = 0$, least number of imaginary roots is (1) 4 (2) 5 (3) 6 (4) 2
4.	Characteristic roots of a Hermitian matrix are all (1) zero (2) imaginary (3) complex (4) real
5.	One root of the equation $ax^3 + bx^2 + cx + d = 0$ is equal to the sum of the other two if (1) $b^3 + 4abc + 8a^2d = 0$ (2) $b^2 + 4abc - 8a^2d = 0$ (3) $b^3 - 4abc + 8a^2d = 0$ (4) $b^3 - 4abc - 8a^2d = 0$
6.	The roots of the equation $2 x^3 + 6 x^2 + 5 x + k = 0$ are in A. P. Then the value of K is (1) -1 (2) 1 (3) -2 (4) 2
7.	If $\frac{x^n - 2^n}{x - 2} = 80$ and n is a positive integer, then the value of n is (1) 2 (2) 3 (3) 4 (4) 5

Question No.	Q	uestions
8.	Let $f(x) = \begin{cases} ax+1, & x \le 2 \\ 3ax+b, & 2 < x < 4 \\ 6, & x \ge 4 \end{cases}$	
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	s continuous everywhere, are
	(1) $\frac{-5}{8}$, $\frac{3}{2}$ (2)	$(\frac{5}{8}, \frac{-3}{2})$
	(3) $\frac{5}{8}$, $\frac{3}{2}$ (4)	$\frac{5}{3}, \frac{2}{3}$
9.	Derivative of $\cos^{-1} \sqrt{\frac{1+x}{2}}$, $0 \le x < 1$	1 is
	(1) $\frac{-2}{\sqrt{1-x^2}}$ (2)	$\frac{-1}{2\sqrt{1-x^2}}$
	(3) $-\frac{1}{\sqrt{1-x^2}}$ (4)	$\frac{1}{2\sqrt{1-x^2}}$
10.	The radius of curvature P for the	curve xy = c, c being constant, is
	(1) $(x^2 + y^2)^{-\frac{3}{2}}$ (2)	$\frac{(x^2 + y^2)^{\frac{3}{2}}}{c}$
	(1) $(x^2 + y^2)^{-\frac{3}{2}}$ (2) $(x^2 + y^2)^{\frac{2}{3}}$ (4)	$\frac{(x^2 + y^2)^{\frac{3}{2}}}{2c}$
11.	Oblique asymptotes to the curve	$y^2 (x-2 a) = x^3 - a^3 are$
	(1) $y \pm x + 2 a = 0$ (2)	$x \pm y + 2 a = 0$
	(3) $x \pm y + a = 0$ (4)	$y \pm x + a = 0$
12. Area between the parabolas $x^2 = 4$ ay and $y^2 = 4$ ax is		$4 \text{ ay and } y^2 = 4 \text{ ax is}$
	(1) $\frac{3}{8} a^2$ (2)	$\frac{8}{3}a^2$
	(3) $\frac{16}{2}$ a ² (4	$\frac{16}{5} a^2$

Question No.	Questions
13.	$\int_{0}^{1} x^{6} \sqrt{1-x^{2}} dx =$ (1) $5\pi/32$ (2) $5\pi/16$ (3) $3\pi/128$ (4) $3\pi/32$
14.	Co-ordinates of the centre of the conic $8 x^2 - 24 xy + 15 y^2 + 48 x - 48 y = 0$, are (1) (4, 3) (2) (3, 4) (3) (3, 2) (4) (2, 3)
15.	Radius of the sphere $x^{2} + y^{2} + z^{2} - 4x + 6y - 8z + 4 = 0 \text{ is}$ (1) 3 (2) 4 (3) $\frac{4}{7}$ (4) 5
16.	The condition that the plane ax + by + cz = 0 cuts the cone xy + yz + zx = 0 in perpendicular lines, is (1) $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 1$ (2) $\frac{1}{a} + \frac{2}{b} + \frac{3}{c} = 0$ (3) $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$ (4) $a + b + c = 0$
17.	Value of $\tan \left(i \log \frac{a - ib}{a + ib}\right)$ is (1) $\frac{ab}{a^2 - b^2}$ (2) $\frac{2 ab}{a^2 - b^2}$ (3) $\frac{2 ab}{\left(a^2 - b^2\right)^2}$ (4) $\frac{4 ab}{a^2 - b^2}$

Question No.	those the second	Questions	
18.	Which of the following congruences have solution		
- 12	(1) $x^2 \equiv 2 \pmod{59}$	$(2) x^2 \equiv -2 \pmod{59}$	
	(3) $x^2 \equiv 2 \pmod{61}$	$(4) x^2 \equiv -2 \pmod{61}$	
19.	If $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$, then $x =$		
	ded	(2) $\frac{1}{3}$	
	(3) $\frac{4}{7}$	(4) $\frac{1}{6}$	
20.	If cosh x = 2, then x =		
	(1) $\log (2-\sqrt{5})$	(2) $\log \left(2-\sqrt{3}\right)$	
	(3) $\log (2 + \sqrt{5})$	(4) $\log \left(2+\sqrt{3}\right)$	
21.	Sum of the series		
	$\sinh x + \frac{\sinh 2x}{2} + \frac{\sinh 3x}{3} + \cdots$	∞, is	
	(1) $\frac{1}{2}(i\pi-x)$	(2) $\frac{1}{2} (i\pi + x)$	
	(3) iπ-x	(4) iπ+x	
22.	An integrating factor of $x \frac{dy}{dx}$		
	(1) xe ^x	(2) xe ^{2x}	
	(3) xe ^{3x}	(2) xe^{2x} (4) $\frac{1}{2}xe^{-3x}$	

uestion No.	Questions
23.	For the differential equation $\frac{d^2y}{dx^2} + ay = -4 \sin 2x$, if $y = x \cos 2x$ is a particular solution, then the value of a is (1) 4 (2) -4 (3) $\frac{1}{4}$ (4) $-\frac{1}{4}$
24.	Orthogonal trajectories of the family of parabolas $y^2 = 4$ ax are (1) $2x^2 + y^2 = c$ (2) $x^2 + 2y^2 = c$ (3) $x^2 = 4$ ay $+c$ (4) $y^2 = 4x + \frac{c}{a}$
25.	The differential equation of the type y = px + f (p) is known with the name (1) Euler (2) Lagrange (3) Clairaut (4) Cauchy
26.	λ is (1) 0 (2) -1 (3) 2 (4) -2
27	. Magnitude of maximum directional derivative of $\phi(x, y, z) = x^2 - 2 y^2 + 4 z^2 \text{ at the point } (1, 1, -1) \text{ is}$ $(1) \sqrt{21}$ $(2) 2\sqrt{21}$ $(3) 3\sqrt{21}$ $(4) 27/4$
2	8. A particle moves along the curve $x = 4 \cos t$, $y = 4 \sin t$, $z = 6 t$, where t is time. Magnitude of acceleration

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Question No.	ion Questions	Code-A
29.	Using Stoke's theorem, value of the integral where c is the curve $x^2 + y^2 = 1$, $z = y^2$; is	$\oint_{C} (yz dx + xz dy + xy dz)$
- 1	(1) 0 (2) 1 (3) 2 (4)	7/2
30.	If $\vec{f} = 3 \text{ xy } \hat{i} - y^2 \hat{j}$, then $\int_{c} \vec{f} \cdot dr$, where c is the curve of $(1, 2)$; is	$y = 2 x^2$, from (0, 0) to
	(1) $\frac{5}{7}$ (2) $\frac{7}{5}$ (3) $-\frac{7}{6}$ (4)	-8/2
31.		7.0
	(1) $\frac{1}{2}$ (2) $\frac{3}{2}$ (3) $\frac{2}{3}$ (4)	3/4
32.	If $u = 2 xy$, $v = x^2 - y^2$, $x = r \cos \theta$, $y = r \sin \theta$, then	$\theta(\mathbf{u}, \mathbf{v}) =$
	(1) $-4r^3$ (2) $-4r^2$ (3) $-2r^3$ (4)	$\frac{\partial (\mathbf{r}, \mathbf{\theta})}{- 3 \mathbf{r}^2}$
33.	If $u = f(x + 2y) + g(x - 2y)$, then $4\frac{\partial^2 u}{\partial x^2} =$	
	(1) $-\frac{\partial^2 u}{\partial y^2}$ (2) $\frac{\partial^2 u}{\partial y^2}$ (3) $2\frac{\partial^2 u}{\partial y^2}$ (4) $-2\frac{\partial^2 u}{\partial y^2}$	
	$(3) 2\frac{\partial^2 \mathbf{u}}{\partial \mathbf{y}^2} \qquad \qquad (4) -2\frac{\partial^2 \mathbf{u}}{\partial \mathbf{y}^2}$	
	If $u = \log (x^2 + xy + y^2)$ then $u \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$	
((1) 0 (2) -1 (3) 1 (4)	2

Question No.		Questions	
35.	The envelope of the family parameter; is (1) $x^2 = 4 (y + 1)$	y of curves $(x - a)^2 + y^2 = 4$ a, a being the (2) $x^2 = 2(x + 1)$	
	(3) $y^2 = 4 (x + 1)$	(4) $y^2 = -4(x+1)$	
36.	The locus of centre of curva	ture for a curve is called its	
	(1) envelope	(2) evolute	
	(3) torsion	(4) characteristic	
37.	$\lim_{x \to 0} \frac{\left(\tan^{-1} x\right)^2}{\log\left(1 + x^2\right)} =$		
	(1) 0 (2) $\frac{1}{2}$	(3) 1 (4) $\frac{3}{2}$	
38.	Partial differential equation obtained by eliminating the arbitrary constants a and b from the relation $2z = (ax + y)^2 + b$, is		
	constants a and b from the	relation $2z = (ax + y)^2 + b$, is	
		relation 2 z = $(ax + y)^2 + b$, is (2) $py + qx = q^2$	
39.	(1) $px + qy = q^2$	$(2) py + qx = q^2$	
39.	 (1) px + qy = q² (3) px + qy = p² Solution of px + qy = 3 z is 	$(2) py + qx = q^2$	
39.	 (1) px + qy = q² (3) px + qy = p² Solution of px + qy = 3 z is 	(2) $py + qx = q^{2}$ (4) $py + qx = p^{2}$ (2) $f\left(\frac{y}{x}, \frac{x^{3}}{z}\right) = 0$	
39.	(1) $px + qy = q^2$ (3) $px + qy = p^2$ Solution of $px + qy = 3z$ is (1) $f\left(\frac{y}{x}, \frac{x^2}{z}\right) = 0$ (3) $f\left(\frac{x}{y}, \frac{x^2}{z}\right) = 0$	(2) $py + qx = q^{2}$ (4) $py + qx = p^{2}$ (2) $f\left(\frac{y}{x}, \frac{x^{3}}{z}\right) = 0$	
	(1) $px + qy = q^2$ (3) $px + qy = p^2$ Solution of $px + qy = 3z$ is (1) $f\left(\frac{y}{x}, \frac{x^2}{z}\right) = 0$ (3) $f\left(\frac{x}{y}, \frac{x^2}{z}\right) = 0$	(2) $py + qx = q^2$ (4) $py + qx = p^2$ (2) $f\left(\frac{y}{x}, \frac{x^3}{z}\right) = 0$ (4) $f\left(\frac{x}{y}, \frac{x^3}{z}\right) = 0$	

Question No.	Questions		
41.	The equation $\frac{\partial^2 \mathbf{u}}{\partial \mathbf{x}^2} + 2 \frac{\partial^2 \mathbf{u}}{\partial \mathbf{y}^2} + \frac{\partial^2 \mathbf{u}}{\partial \mathbf{z}^2} = 2 \frac{\partial^2 \mathbf{u}}{\partial \mathbf{x} \partial \mathbf{y} +} + 2 \frac{\partial^2 \mathbf{u}}{\partial \mathbf{y} \partial \mathbf{z}}$ is		
140	(1) Linear (2) Elliptic (3) Hyperbolic (4) Parabolic		
42.	Every given system of forces acting on a rigid body can be reduced to a		
	(1) Couple (2) Screw (3) Wrench (4) Null force		
43.	Absolute units of moment in S.I. system is (1) Dyne centimeter (2) Gram centimeter (3) Kg. meter (4) Newton meter		
44.	For two equal forces acting on a particle, if square of their resultant is three times their product, then the angle between these forces is (1) $\frac{\pi}{2}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{6}$		
45.	A body is slightly displaced and still remains in equilibrium in any position, then such equilibrium is known as (1) Perfect equilibrium (2) Stable equilibrium (3) Neutral equilibrium (4) Natural equilibrium		
46.	A body of weight 4 kg. rests in equilibrium on an inclined plane whose slope is 30°. The co-efficient of friction is (1) $\sqrt{3}$ (2) $\frac{1}{\sqrt{2}}$ (3) $\frac{1}{\sqrt{3}}$ (4) $\frac{2}{\sqrt{3}}$		

Question No.	Questions	
47.	The series $\frac{2p}{1^q} + \frac{3p}{2^q} + \frac{4p}{3^q} + \cdots$ is convergent if (1) $p < q - 2$ (3) $p > q$	-, where p and q are positive real numbers, (2) $p < q - 1$ (4) $p = q$
48.	The series $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n^5}$ is (1) Absolutely convergent (3) Conditionally convergent	(2) Divergent (4) Oscillatory
49.	The limit superior and limit in (1) 0, 0 (3) 1, -1	nferior of $\left\{\frac{\left(-1\right)^n}{n^2}\right\}$ are respectively equal to $(2) 1, 0$ $(4) -1, 0$
50.		ent and the series < b _n > is monotonic and a _n b _n is convergent. This result is due to (2) Leibnitz (4) Abel
51.	$\left\{J_{\frac{1}{2}}(x)\right\}^{2} + \left\{J_{-\frac{1}{2}}(x)\right\}^{2} =$ (1) $\frac{\pi x}{2}$ (2) $\frac{x}{2\pi}$	$(3) \frac{2}{\pi x} \qquad (4) \frac{\pi}{2x}$

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Question No.	Questions
52.	If the Hermite polynomial of degree n is denoted by $H_n(x)$, then $H_1(x) =$
	(1) x (2) 2 x (3) -2 x (4) $\frac{x}{2}$
53.	$\int_{0}^{\infty} t e^{-2t} \cos t dt =$
	(1) $\frac{3}{16}$ (2) $\frac{9}{16}$ (3) $\frac{3}{25}$ (4) $\frac{9}{25}$
54.	$\vec{\mathbf{L}}^1 \left\{ \frac{1}{\left(\mathbf{s}-4\right)^3} \right\} =$
	(1) $\frac{1}{4} \operatorname{te}^{3t}$ (2) $\frac{1}{4} \operatorname{t}^{2} \operatorname{e}^{4t}$ (3) $\frac{1}{2} \operatorname{te}^{4t}$ (4) $\frac{1}{2} \operatorname{t}^{2} \operatorname{e}^{4t}$
55.	Fourier transform of the function $f(t) = \begin{cases} e^{-at}, & t > 0, a > 0 \\ 0, & t < 0 \end{cases}$ is
	(1) $\frac{1}{a+is}$ (2) $\frac{\pi}{a+is}$ (3) $\frac{a}{\pi+is}$ (4) $\frac{\pi a}{1+is}$
56.	Given that int x = 1, y = 4; x = + + x +y; Then the value of x is
	(1), 4 (2) 5 (3) 6 (4) 7
57.	The continue statement cannot be used with (1) do (2) while (3) for (4) switch

Question No.	Questions
58.	The expression $(*p) \cdot x$ is equivalent to (1) $*p \rightarrow x$ (2) $p \rightarrow x$ (3) $p \rightarrow \cdot x$ (4) $p = x$
59.	The result of the expression (17 * 4) % (int) 9-3 is (1) 5 (2) 4 (3) 3.7 (4) 7.3
60.	The condition for covergence of the Newton - Raphson method to a root α is $(1) \frac{f'(\alpha)}{f''(\alpha)} < 0 \qquad \qquad (2) \frac{f'(\alpha)}{f''(\alpha)} < 1$ $(3) \frac{f'(\alpha)}{f''(\alpha)} > 1 \qquad \qquad (4) \frac{f'(\alpha)}{f''(\alpha)} < 2$
61.	The improper integral $\int_1^2 \frac{x}{\sqrt{x-1}} dx$ converges to (1) $\frac{5}{3}$ (2) $\frac{8}{3}$ (3) $\frac{3}{8}$ (4) $\frac{3}{5}$
62.	Which of the following statements is not true (1) Every singleton set is connected in any metric space (2) Empty set is connected in every metric space (3) Every subset having at least two points of a metric space is not connected (4) None of these
63.	$\int_{1}^{\infty} \frac{\sin x}{x^{m}} dx \text{ converges absolutely if}$ (1) m < 1 (2) m > 1 (3) m = 0 (4) m \le 1

Question No.	Questions Code-A
64.	A totally bounded metric space is
	(1) Compact (2) Complete
	(4) Everywhere dense
65.	If the set A is open and the set B is closed in R ⁿ , then
	(1) B-A is closed (2) B-A is open
	(3) B-A is semi-open (4) B-A is null set
66.	For a Cantor's ternary set, which of the following is not correct
	(1) It is closed (2) It is uncountable
	(3) It is dense (4) It is perfect set
67.	Let f be a bounded function defined on the bounded interval [a, b].
	Then f is Riemann integrable on [a, b] iff
	(1) $\int_a^b f \ge f_a^{\bar{b}} f$ (2) $\int_a^b f \le f_a^{\bar{b}} f$
	(3) $\int_{a}^{b} f < f_{a}^{\bar{b}} f$ (4) $\int_{a}^{b} f = f_{a}^{\bar{b}} f$
68.	If G is a non-abelian group of order 125, then O (Z (G)) is
	(1) 25 (2) 125 (3) 5 (4) 10
69.	The number of abelian groups upto isomorphism of order 10 ⁵ is
	(1) 50 (2) 49 (3) 45 (4) 39
70.	The number of generators of a finite group of order 53 are
	(1) 53 (2) 52 (3) 54 (4) [52

uestion No.	Questions		
71.	The number of prime ideals of Z_{10} is $(1) 2 \qquad (2) 4 \qquad (3) 5 \qquad (4) 10$		
72.	 If f:G→G' is group homomorphism, then f is one-one if Kernel f is (1) Empty (2) Singleton set (3) Any set (4) Set of identity element 		
73.	An ideal S of a commutative ring R with unity is maximal iff R/S is (1) An ideal (2) A vector space (3) A ring (4) A field		
74.	Which of the following statements is false (1) Every field is a ring (2) Every finite integral domain is a field (3) Every field is an integral domain (4) Every integral domain is a field		
75.	1.4 m/sec ² . The thrust of his feet on the lift (in Newton) is (1) 784 N (2) 780 N (3) 692 N (4) 980 N		
-	The horizontal range of a projectile is three times the greatest height		

Question No.		Questions		
77.	The law of force towards the pole under the curve $r^2 = 2$ ap is			
	(1) $F \alpha \frac{1}{r^2}$	(2) $F \alpha \frac{1}{r^3}$	111 41	
	(3) $F \alpha \frac{1}{r^4}$	(4) $F \alpha \frac{1}{r^5}$		
78.		n the tangent at a point make lation between angular velocity w		
94	(1) w = vr	$(2) \mathbf{w} = \frac{\mathbf{v} \cos \theta}{\mathbf{r}}$		
	(3) $w = \frac{v \sin \theta}{r}$	(4) $w = v r \sin \theta$		
79.	Two particles of mass m a	nd 4 m are moving with equal mom	entum. The	
	(1) 1:2 (2) 2:1	(3) 1:4 (4) 4:1	Diame.	
80.	(1) 1:2 (2) 2:1		pse having	
80.	(1) 1:2 (2) 2:1 Kepler law of motion say	(3) 1:4 (4) 4:1	pse having	
80.	(1) 1:2 (2) 2:1 Kepler law of motion say the sum at its	(3) 1:4 (4) 4:1 that each planet describes an elli	pse having	
80.	(1) 1:2 (2) 2:1 Kepler law of motion say the sum at its (1) Focus (3) Origin	 (3) 1:4 (4) 4:1 that each planet describes an ellipse. (2) Centre. (4) Outer cover. cloid s = 4 a sin ψ with uniform specified. 	10 T	
	(1) 1:2 (2) 2:1 Kepler law of motion say the sum at its (1) Focus (3) Origin A particle describes the original states and the sum at its	 (3) 1:4 (4) 4:1 that each planet describes an ellipse. (2) Centre. (4) Outer cover. cloid s = 4 a sin ψ with uniform specified. 	100 TO	

12.3

Question No.	G	Questions
82.	$\int_0^2 (8 - x^3)^{-\frac{1}{3}} dx =$	Reference (IV. c.s.)
		(2) $\frac{1}{3}$ $\beta\left(\frac{1}{3}, \frac{2}{3}\right)$
	(3) $\frac{2}{3}\beta\left(\frac{1}{3},\frac{2}{3}\right)$	(4) $\beta\left(\frac{1}{3}, \frac{2}{3}\right)$
83.	$\Gamma(n)\Gamma(1-n)=$) errilly
No. of Tax	$(1) \frac{\pi}{\sin n\pi}$	$\frac{\sin n\pi}{\pi}$
	$(3) \frac{n\pi}{\sin n\pi}$	$(4) \frac{2\pi}{\sin n\pi}$
84.	If Fourier co-efficient of f (t	t) are Cn, then Fourier co-efficients of
1.5	$\overline{f(t)}$ are	
	$\overline{f(t)}$ are (1) $\overline{C_n}$	(2) C-n
	(1) \overline{C}_{n} (3) $-\overline{C}_{n}$	(2) \overline{C}_{-n} (4) $-\overline{C}_{-n}$
85.	(1) \overline{C}_{n} (3) $-\overline{C}_{n}$	(2) \overline{C}_{-n} (4) $-\overline{C}_{-n}$
85.	(1) \overline{C}_{n} (3) $-\overline{C}_{n}$	(2) C-n
85.	(1) \overline{C}_n (3) $-\overline{C}_n$ By changing the order of integration of $\frac{3a}{4}$ (3) $\frac{4\pi a}{3}$	(2) \overline{C}_{-n} (4) $-\overline{C}_{-n}$ gration, the value of $\int_0^a \int_y^a \frac{x dx dy}{x^2 + y^2} =$ (2) $\frac{3\pi a}{4}$ (4) $\frac{\pi a}{4}$
85.	(1) \overline{C}_n (3) $-\overline{C}_n$ By changing the order of interest (1) $\frac{3a}{4}$ (3) $\frac{4\pi a}{3}$ Given that $f(z) = 2x^2 + y + i$ (2)	(2) \overline{C}_{-n} (4) $-\overline{C}_{-n}$ gration, the value of $\int_0^a \int_y^a \frac{x dx dy}{x^2 + y^2} =$ (2) $\frac{3\pi a}{4}$
	(1) \overline{C}_n (3) $-\overline{C}_n$ By changing the order of integration of $\frac{3a}{4}$ (3) $\frac{4\pi a}{3}$	(2) \overline{C}_{-n} (4) $-\overline{C}_{-n}$ gration, the value of $\int_0^a \int_y^a \frac{x dx dy}{x^2 + y^2} =$ (2) $\frac{3\pi a}{4}$ (4) $\frac{\pi a}{4}$

Questi No.	Questions
87.	
88.	Fixed point of the transformation $w = \frac{3z-4}{z-1}$ is (1) $z = 4$ (2) $z = 3$ (3) $z = 2$ (4) $z = 1$
89.	If V and W are vector spaces, then a linear transformation T from V to V is isomorphism if it is (1) into (2) one-one (3) onto (4) orthogonal
90.	If $W = \{ (a, b, c, d) : b + c + d = 0 \}$ is a subspace of R^4 , then dim W is (1) 4 (2) 3 (3) 2 (4) 1
	In an inner product space V (F), the inequality $ (\alpha, \beta) \le \alpha \cdot \beta \forall \alpha, \beta \in V$, is called (1) Schwarz inequality (2) Triangle inequality (3) Bessel's inequality (4) Normal inequality
)2. If	u and v are normal vectors in an inner product space V, then $\ \mathbf{u} - \mathbf{v}\ = 0$ (2) 1 (3) 2 (4) $\sqrt{2}$

Question No.	Questions
93.	Which of the following is a orthogonal set (1) {(1, 0, 1), (1, 0, -1), (0, 1, 0)} (2) {(1, 0, 1), (1, 0, -1), (-1, 0, 1)} (3) {(1, 0, 1), (1, 0, -1), (0, 2, 3)} (4) None of these
94.	The missing term in the table x 0 1 2 3 4
95.	The sum of eigen values of a square matrix A of order n is equal to (1) $\frac{n}{2}$
96.	In Simpson's $\frac{3}{8}$ th rule, the interpolating polynomial is of degree (1) 2 (2) 1 (3) 4 (4) 3
97.	Root of the equation $x^4 - 12 x + 7 = 0$ which is approximately equal to 2, is (1) 1.92 (2) 1.95 (3) 2.05 (4) 2.15
98.	Which of the following is not correct (1) $\Delta = (1 - \nabla)^{-1}$ (2) $1 - E^{-1} = \nabla$ (3) $E = 1 + \Delta$ (4) $\delta = E^{\frac{1}{2}} - E^{-\frac{1}{2}}$

Question No.		estions
99.	For a normal distribution having r most probable limits are	nean μ and standard deviation σ, the
· 10	(1) μ±σ (2)	μ±2σ
	(3) $\mu \pm \frac{3}{2} \sigma$ (4)	μ±3σ
100.	In Gauss quadrature formula, the	range of integration is
	(1) [0, 1] (2)	[-1, 1]
	(3) [0, n] (4	[-1, 0]

Question No.	Questions			
1.	The number of prime ideals of Z_{10} is (1) 2 (2) 4 (3) 5 (4) 10			
2.	 If f:G→G' is group homomorphism, then f is one-one if Kernel f is (1) Empty (2) Singleton set (3) Any set (4) Set of identity element 			
3.	An ideal S of a commutative ring R with unity is maximal iff R/S is (1) An ideal (2) A vector space (3) A ring (4) A field			
4.	Which of the following statements is false (1) Every field is a ring (2) Every finite integral domain is a field (3) Every field is an integral domain (4) Every integral domain is a field			
5.	A person weighing 70 kg, is in a lift ascending with an acceleration of 1.4 m/sec ² . The thrust of his feet on the lift (in Newton) is (1) 784 N (2) 780 N (3) 692 N (4) 980 N			
6.	The horizontal range of a projectile is three times the greatest height, the angle of projection is (1) $\tan^{-1}\frac{3}{2}$ (2) $\tan^{-1}\frac{2}{3}$ (3) $\tan^{-1}\frac{4}{3}$ (4) $\tan^{-1}\frac{3}{4}$			

Question No.			10000	tions				
7.	The law of force							4
	(1) $F \alpha \frac{1}{r^2}$		(2)	$F \alpha \frac{1}{r^3}$				
. 24	(3) $F \alpha \frac{1}{r^4}$		(4)	$F \alpha \frac{1}{r^5}$		a most	10	
8.	If θ be the an radius vector, to velocity v is	hen the re	elation be	tween ans	gular	int mak velocity	es with w and	h the linear
	(1) w = vr		(2)	$w = \frac{v \cos \theta}{r}$	9			
	(3) $w = \frac{v \sin \theta}{r}$		(4)	w = vr sir	ıθ			
			9 9		241	anal mo	mentun	n The
9.	Two particles of ratio of their ki	netic energ	gies is					
	ratio of their king (1) 1:2 (2	netic energ	gies is (3)	1:4	(4)	4:1		
10.	ratio of their king (1) 1:2 (2) Kepler law of m	netic energ	gies is (3)	1:4	(4)	4:1		
	ratio of their king (1) 1:2 (2) Kepler law of mosum at its	netic energ	gies is (3)	1:4	(4)	4:1		
	ratio of their king (1) 1:2 (2) Kepler law of m	netic energ	(3) that each	1:4 planet de	(4)	4:1		
10.	ratio of their king (1) 1:2 (2) Kepler law of many sum at its (1) Focus (3) Origin $\left\{J_{\frac{1}{2}}(x)\right\}^2 + \left\{J_{-\frac{1}{2}}^{\frac{1}{2}}\right\}^2$	netic energy 2) 2:1 otion says $(x) \Big\}^2 =$	(3) that each (2) (4)	1:4 planet de Centre Outer cov	(4) scribe	4:1	se havi	
10.	ratio of their king (1) 1:2 (2) Kepler law of mosum at its (1) Focus (3) Origin	netic energy 2) 2:1 otion says $(x) \Big\}^2 =$	(3) that each (2) (4)	1:4 planet de Centre Outer cov	(4) scribe	4:1	se havi	

Question No.	Questions	W
12.	If the Hermite polynomial of degree n is denoted by $H_n(x)$, then $H_1(1) \times (2) \times (3) -2 \times (4) \times \frac{x}{2}$	(x) =
13.	$\int_{0}^{\infty} t e^{-2t} \cos t dt =$	-21
	(1) $\frac{3}{16}$ (2) $\frac{9}{16}$ (3) $\frac{3}{25}$ (4) $\frac{9}{25}$,010
14.	$\vec{L}^{1}\left\{\frac{1}{\left(s-4\right)^{3}}\right\} =$	
	(1) $\frac{1}{4} \operatorname{te}^{3t}$ (2) $\frac{1}{4} \operatorname{t}^{2} \operatorname{e}^{4t}$ (3) $\frac{1}{2} \operatorname{te}^{4t}$ (4) $\frac{1}{2} \operatorname{t}^{2} \operatorname{e}^{4t}$	
15.	Fourier transform of the function $f(t) = \begin{cases} e^{-at}, & t > 0, a > 0 \\ 0, & t < 0 \end{cases}$ is $(1) \frac{1}{a+is} (2) \frac{\pi}{a+is} (3) \frac{a}{\pi+is} (4) \frac{\pi a}{1+is}$	
16.	Given that int $x = 1$, $y = 4$; x = + + x +y; Then the value of x is (1) 4 (2) 5 (3) 6 (4) 7	24
17.	The continue statement cannot be used with (1) do (2) while (3) for (4) switch	

Question No.	Questions
18.	The expression (*p)·x is equivalent to
	$(1) *p \to x \qquad (2) p \to x$
	$(3) \mathbf{p} \to \mathbf{x} \qquad \qquad (4) \mathbf{p} = \mathbf{x}$
19.	The result of the expression (17 * 4) % (int) 9-3 is
	(1) 5 (2) 4 (3) 3.7 (4) 7.3
20.	The condition for covergence of the Newton - Raphson method to a root α is
	(1) $\frac{f'(\alpha)}{f''(\alpha)} < 0$ (2) $\frac{f'(\alpha)}{f''(\alpha)} < 1$
	(3) $\frac{f'(\alpha)}{f''(\alpha)} > 1$ (4) $\frac{f'(\alpha)}{f''(\alpha)} < 2$
21.	If Lagrange's mean value theorem is used on the function $f(x) = x(x-1)$ in [1, 2], then the value of 'c' is
21.	If Lagrange's mean value theorem is used on the function $f(x) = x(x-1)$ in [1, 2], then the value of 'c' is (1) $\frac{1}{2}$ (2) $\frac{3}{2}$ (3) $\frac{2}{3}$ (4) $\frac{3}{4}$
21.	[1, 2], then the value of 'c' is
	[1, 2], then the value of 'c' is (1) $\frac{1}{2}$ (2) $\frac{3}{2}$ (3) $\frac{2}{3}$ (4) $\frac{3}{4}$
	[1, 2], then the value of 'c' is (1) $\frac{1}{2}$ (2) $\frac{3}{2}$ (3) $\frac{2}{3}$ (4) $\frac{3}{4}$ If $u = 2$ xy, $v = x^2 - y^2$, $x = r \cos \theta$, $y = r \sin \theta$, then $\frac{\partial (u, v)}{\partial (r, \theta)} =$
22.	[1, 2], then the value of 'c' is (1) $\frac{1}{2}$ (2) $\frac{3}{2}$ (3) $\frac{2}{3}$ (4) $\frac{3}{4}$ If $u = 2 \text{ xy}$, $v = x^2 - y^2$, $x = r \cos \theta$, $y = r \sin \theta$, then $\frac{\partial (u, v)}{\partial (r, \theta)} =$ (1) $-4r^3$ (2) $-4r^2$ (3) $-2r^3$ (4) $-3r^2$

Question No.		Questions	
24.	If $u = \log (x^2 + xy + y^2)$ the	$u \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$	
	(1) 0 (2) -1	(3) 1 (4) 2	
25.	The envelope of the fami	of curves $(x - a)^2 + y^2 = 4$	a, a being the
	(1) $x^2 = 4 (y + 1)$	(2) $x^2 = 2(x+1)$	
	(3) $y^2 = 4(x+1)$	(4) $y^2 = -4(x+1)$	
26.	The locus of centre of curv	ture for a curve is called its	10
	(1) envelope	(2) evolute	
	(3) torsion	(4) characteristic	
27.	$\lim_{x \to 0} \frac{\left(\tan^{-1} x\right)^2}{\log\left(1 + x^2\right)} =$		1
	(1) 0 (2) $\frac{1}{2}$	(3) 1 (4) $\frac{3}{2}$	
28.		on obtained by eliminating relation $2z = (ax + y)^2 + b$, is	the arbitrary
20.0		(2) $py + qx = q^2$	i
	$(3) px + qy = p^2$	(4) $py + qx = p^2$	
29.	Solution of $px + qy = 3z$ is	e e	St of U
	$(1) f\left(\frac{y}{x}, \frac{x^2}{z}\right) = 0$	(2) $f\left(\frac{y}{x}, \frac{x^3}{z}\right) = 0$	
	(3) $f\left(\frac{x}{y}, \frac{x^2}{z}\right) = 0$	(4) $f\left(\frac{x}{y}, \frac{x^3}{z}\right) = 0$	

Question No.	Qu	estions		
30.	P.I. of the partial differential equation $(D^2 - 2 DD^1 + D'^2) z = 12 xy$, is			
	(1) $2 x^3 y + x^4$ (2)	$2 x^3 y + y^3$		
-		$2 x^3 y + 3 x^4$		
31.	Oblique asymptotes to the curve	$y^2 (x-2 a) = x^3 - a^3 are$		
	(-)	$x \pm y + 2 a = 0$		
	(3) $x \pm y + a = 0$ (4)	$y \pm x + a = 0$		
32.	Area between the parabolas $x^2 = 4$	$4 \text{ ay and } y^2 = 4 \text{ ax is}$		
		$\frac{8}{3}a^2$		
	(3) $\frac{16}{3}$ a ² (4)	$\frac{16}{5} a^2$		
33.	$\int_0^1 x^6 \sqrt{1-x^2} dx =$			
	(1) $5\pi/32$ (2)	$\frac{5\pi}{16}$		
	(3) $3\pi/128$ (4)	1) $3\pi/32$		
34.	Co-ordinates of the centre of the	conic		
	$8 x^2 - 24 xy + 15 y^2 + 48 x - 48 y$	= 0, are		
	(1) (4, 3)	2) (3, 4)		
	(3) (3, 2)	4) (2, 3)		
35.	Radius of the sphere			
	$x^2 + y^2 + z^2 - 4x + 6y - 8z + 4 =$	0 is		
	(1) 3 (2) 4	3) 4/7 (4) 5		

Question No.	Questions		
36.	The condition that the plane $ax + by + cz = 0$ cuts the cone $xy + yz + zx = 0$ in perpendicular lines, is		
	(1) $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 1$	(2) $\frac{1}{a} + \frac{2}{b} + \frac{3}{c} = 0$	
	(3) $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$	(4) $a + b + c = 0$	
37.	Value of $\tan \left(i \log \frac{a - ib}{a + ib}\right)$ is		
	$(1) \frac{ab}{a^2 - b^2}$	(2) $\frac{2 \text{ ab}}{a^2 - b^2}$	
	(3) $\frac{2 \text{ ab}}{\left(a^2 - b^2\right)^2}$	(4) $\frac{4 \text{ ab}}{a^2 - b^2}$	
38.	Which of the following congruen	nces have solution	
	$(1) x^2 \equiv 2 \pmod{59}$	$(2) \mathbf{x}^2 \equiv -2 \pmod{59}$	
	$(3) \mathbf{x}^2 \equiv 2 \pmod{61}$	$(4) x^2 \equiv -2 \pmod{61}$	
39.	If $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$, then	n x =	
	(1) $\frac{1}{2}$ (2) $\frac{1}{3}$	(3) $\frac{4}{7}$ (4) $\frac{1}{6}$	
40.	If $cosh x = 2$, then $x =$	A Property of the Park of the	
	(1) $\log \left(2-\sqrt{5}\right)$	(2) $\log \left(2-\sqrt{3}\right)$	
	(3) $\log (2 + \sqrt{5})$	(4) $\log (2 + \sqrt{3})$	

Question No.			
41.	In an inner product space V (F), the inequality $\left \left(\alpha,\beta\right)\right \leq \left\ \alpha\right\ \cdot \left\ \beta\right\ \forall \alpha,\beta \in V$,		
	is called		
*	(1) Schwarz inequality		
	(2) Triangle inequality		
	(3) Bessel's inequality		
	(4) Normal inequality		
42.	If u and v are normal vectors in an inner product space V, then $\ \mathbf{u} - \mathbf{v}\ = (1) \ 0$ (2) 1 (3) 2 (4) $\sqrt{2}$		
43.	Which of the following is a orthogonal set (1) $\{(1, 0, 1), (1, 0, -1), (0, 1, 0)\}$		
	(1) $\{(1, 0, 1), (1, 0, -1), (0, 1, 0)\}$ (2) $\{(1, 0, 1), (1, 0, -1), (-1, 0, 1)\}$		
	(2) $\{(1, 0, 1), (1, 0, -1), (-1, 0, 2, 3)\}$ (3) $\{(1, 0, 1), (1, 0, -1), (0, 2, 3)\}$		
1. 10			
	(4) None of these		
44.	x 0 1 2 3 4		
	y 1 3 9 81 18 (1) 27 (2) 31 (3) 32 (4) 34		
45	The sum of eigen values of a square matrix A of order n is equal to		
	(1) $\frac{n}{2}$ (2) $\frac{n}{2}$ (3) trace (A) (4) $ A $		

Question No.	Questions
46.	In Simpson's $\frac{3}{8}$ th rule, the interpolating polynomial is of degree (1) 2 (2) 1 (3) 4 (4) 3
47.	Root of the equation $x^4 - 12 x + 7 = 0$ which is approximately equal to 2, is (1) 1.92 (2) 1.95 (3) 2.05 (4) 2.15
48.	Which of the following is not correct (1) $\Delta = (1 - \nabla)^{-1}$ (2) $1 - E^{-1} = \nabla$ (3) $E = 1 + \Delta$ (4) $\delta = E^{\frac{1}{2}} - E^{-\frac{1}{2}}$
49.	For a normal distribution having mean μ and standard deviation σ , the most probable limits are $(1) \mu \pm \sigma \qquad \qquad (2) \mu \pm 2 \; \sigma$ $(3) \mu \pm \frac{3}{2} \; \sigma \qquad \qquad (4) \mu \pm 3 \; \sigma$
50.	In Gauss quadrature formula, the range of integration is (1) [0, 1] (2) [-1, 1] (3) [0, n] (4) [-1, 0]
51.	The improper integral $\int_1^2 \frac{x}{\sqrt{x-1}} dx$ converges to (1) $\frac{5}{3}$ (2) $\frac{8}{3}$ (3) $\frac{3}{8}$ (4) $\frac{3}{5}$

uestion No.	Which of the following statements is not true (1) Every singleton set is connected in any metric space (2) Empty set is connected in every metric space (3) Every subset having at least two points of a metric space is not connected (4) None of these		
52.			
53.	$\int_{1}^{\infty} \frac{\sin x}{x^{m}} dx \text{ converges absolutely if}$ (1) m < 1 (2) m > 1 (3) m = 0 (4) m \le 1		
54.	A totally bounded metric space is (1) Compact (2) Complete (3) Separable (4) Everywhere dense		
55.	If the set A is open and the set B is closed in R ⁿ , then (1) B-A is closed (2) B-A is open (3) B-A is semi-open (4) B-A is null set		
56.	For a Cantor's ternary set, which of the following is not correct (1) It is closed (2) It is uncountable (3) It is dense (4) It is perfect set		
57.	Let f be a bounded function defined on the bounded interval [a, b]. Then f is Riemann integrable on [a, b] iff $ (1) \int_a^b f \geq f_a^5 f (2) \int_a^b f \leq f_a^5 f (3) \int_a^b f < f_a^5 f (4) \int_a^b f = f_a^5 f $		

Question No.	Questions	
58.	If G is a non-abelian group of order 125, then O (Z (G)) is
I E	(1) 25 (2) 125 (3) 5 (4)	10
59.	The number of abelian groups upto isomorphism of	order 10 ⁵ is
	(1) 50 (2) 49 (3) 45 (4)	39
60.	The number of generators of a finite group of order	53 are
	(1) 53 (2) 52 (3) 54 (4)	52
61.	A particle describes the cycloid s = 4 a sin ψ with acceleration at any point is	uniform speed v. The
	(1) $\frac{v^2}{4a}$ (2) $\frac{v^2}{\sqrt{s^2 - 16 a^2}}$	
	(3) $\frac{v^2}{\sqrt{16 a^2 - s^2}}$ (4) $\frac{v^2}{\sqrt{a^2 - s^2}}$	
62.	$\int_0^2 (8-x^3)^{-\frac{1}{3}} dx =$	
	2. $\int_{0}^{2} (8 - x^{8})^{-\frac{1}{3}} dx =$ $(1) \frac{1}{3} \beta \left(\frac{1}{3}, \frac{3}{2}\right) \qquad (2) \frac{1}{3} \beta \left(\frac{1}{3}, \frac{2}{3}\right)$	
	(3) $\frac{2}{3} \beta \left(\frac{1}{3}, \frac{2}{3}\right)$ (4) $\beta \left(\frac{1}{3}, \frac{2}{3}\right)$	
63.		
h	$(1) \frac{\pi}{\sin n\pi} \qquad (2) \frac{\sin n\pi}{\pi}$	
	$(3) \frac{n\pi}{\sin n\pi} \qquad (4) \frac{2\pi}{\sin n\pi}$	Ten Dille

Question No.		Que	stions
64.	If Fourier co-efficient of f (t) are Cn, then Fourier co-efficients of		
	f(t) are	1	THE PERSON NAMED IN
	(1) C _n		C-n
3	(3) - C _n		-Ē-n
65.	By changing the order of inte	gratio	n, the value of $\int_0^a \int_y^a \frac{x dx dy}{x^2 + y^2} =$
	$(1) \frac{3a}{4}$	(2)	$\frac{3\pi a}{4}$
	$(3) \frac{4\pi a}{3}$	(4)	<u>πα</u> 4
66.	Given that $f(z) = 2x^2 + y + i$ (satisfied at		. C – R equations for this function are
	(1) the line $x = 2 y$	(2)	the line $y = 2 x$
	(3) every point of z-plane	(4)	no point of z-plane
67.	Image of $ z-2i = 2$ under the mapping $w = u + iv = \frac{1}{z}$ is		
	(1) $4v+1=0$	(2)	4 u + 1 = 0
	(3) $4v-1=0$	(4)	4 u - 1 = 0
68.	Fixed point of the transform	ation	$\mathbf{w} = \frac{3 \ \mathbf{z} - 4}{\mathbf{z} - 1} \text{ is}$
	(1) z = 4		
	(2) z = 3		
	(3) z = 2		- N
	(4) z=1		R. I. C. B. A. L. B.

Question No.		Questions	
69.	If V and W are vector spa is isomorphism if it is	ces, then a linear transformation T from V to W	
	(1) into	(2) one-one	
	(3) onto	(4) orthogonal	
70.	If $W = \{ (a, b, c, d) : b + c \}$	$+d=0$ is a subspace of R^4 , then dim W is	
	(1) 4 (2) 3		
71.	The equation $\frac{\partial^2 \mathbf{u}}{\partial \mathbf{x}^2} + 2 \frac{\partial^2 \mathbf{u}}{\partial \mathbf{y}^2}$	$\frac{1}{1} + \frac{\partial^2 \mathbf{u}}{\partial \mathbf{z}^2} = 2 \frac{\partial^2 \mathbf{u}}{\partial \mathbf{x} \partial \mathbf{y} +} + 2 \frac{\partial^2 \mathbf{u}}{\partial \mathbf{y} \partial \mathbf{z}} \text{ is}$	
minu	(1) Linear	(2) Elliptic	
	(3) Hyperbolic	(4) Parabolic	
72.	Every given system of forces acting on a rigid body can be reduced to a		
	(1) Couple	(2) Screw	
	(3) Wrench	(4) Null force	
73.	Absolute units of moment	in S.I. system is	
	(1) Dyne centimeter	(2) Gram centimeter	
	(3) Kg. meter	(4) Newton meter	
74.	For two equal forces actin	ng on a particle, if square of their resultant is	
		then the angle between these forces is	
	(1) $\frac{\pi}{2}$	(2) $\frac{\pi}{3}$	
	(3) π/ ₄	(4) $\frac{\pi}{6}$	

Question No.	Questions			
75.	A body is slightly displaced and still remains in equilibrium in any position, then such equilibrium is known as (1) Perfect equilibrium (2) Stable equilibrium (3) Neutral equilibrium (4) Natural equilibrium			
76.	A body of weight 4 kg. rests in equilibrium on an inclined plane whose slope is 30°. The co-efficient of friction is (1) $\sqrt{3}$ (2) $\frac{1}{\sqrt{2}}$ (3) $\frac{1}{\sqrt{3}}$ (4) $\frac{2}{\sqrt{3}}$			
77.	The series $\frac{2p}{1^q} + \frac{3p}{2^q} + \frac{4p}{3^q} + \cdots$, where p and q are positive real numbers, is convergent if (1) $p < q - 2$ (2) $p < q - 1$ (3) $p > q$ (4) $p = q$			
78.	The series $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n^5}$ is (1) Absolutely convergent (2) Divergent (3) Conditionally convergent (4) Oscillatory			
79.	The limit superior and limit inferior of $\left\{\frac{(-1)^n}{n^2}\right\}$ are respectively equal to (1) 0,0 (2) 1,0 (3) 1,-1 (4) -1,0			

Question No.		Que	estions
80.	If the series $\sum_{n=1}^{\infty} a_n$ is converg	gent ai	nd the series < b _n > is monotonic and
	bounded, then the series $\sum_{n=1}^{\infty}$	a _n b _n i	s convergent. This result is due to
	(1) Cauchy	(2)	Leibnitz
	(3) Dirichlet	(4)	Abel
81.	Sum of the series		
	$\sinh x + \frac{\sinh 2x}{2} + \frac{\sinh 3x}{3} + \dots$		∞, is
	$(1) \frac{1}{2} \left(i \pi - \mathbf{x} \right)$	(2)	$\frac{1}{2} (i\pi + x)$
	(3) iπ-x	(4)	iπ+x
82.	An integrating factor of $x \frac{dy}{dx}$	+ (3x	$+1) y = xe^{-2x}$, is
	(1) xe ^x	(2)	xe ^{2x}
	(3) xe ^{3x}	(4)	$\frac{1}{2}xe^{-3x}$
83.	For the differential equation	$\frac{d^2y}{dx^2}$	$-ay = -4 \sin 2x$, if $y = x \cos 2x$ is a
	particular solution, then the	value	of a is
	(1) 4 (2) -4	(3)	$\frac{1}{4}$ (4) $-\frac{1}{4}$
84.	Orthogonal trajectories of the	fami	y of parabolas $y^2 = 4$ ax are
	(1) $2x^2 + y^2 = c$	(2)	$x^2 + 2y^2 = c$
	(3) $x^2 = 4 \text{ ay } + c$	(4)	$y^2 = 4x + \frac{c}{a}$

Question No.	Questions			
85.	The differential equation of the type y = px + f (p) is known with the name (1) Euler . (2) Lagrange (3) Clairaut (4) Cauchy			
86.	The vector $(x+3y) \hat{i} + (y-2z) \hat{j} + (x+\lambda z) \hat{k}$ is solenoidal, then the value of λ is (1) 0 (2) -1 (3) 2 (4) -2			
87.	Magnitude of maximum directional derivative of $\phi(x, y, z) = x^2 - 2 y^2 + 4 z^2 \text{ at the point } (1, 1, -1) \text{ is}$ (1) $\sqrt{21}$ (2) $2\sqrt{21}$ (3) $3\sqrt{21}$ (4) $27/4$			
88.	A particle moves along the curve $x = 4 \cos t$, $y = 4 \sin t$, $z = 6 t$, where t is time. Magnitude of acceleration at time t is (1) 3 (2) $\frac{7}{2}$ (3) $\sqrt{5}$ (4) 4			
89.	Using Stoke's theorem, value of the integral $\oint_C (yzdx + xzdy + xydz)$, where c is the curve $x^2 + y^2 = 1$, $z = y^2$; is (1) 0 (2) 1 (3) 2 (4) $\frac{7}{2}$			
90.	If $\vec{f} = 3 \text{ xy } \hat{i} - y^2 \hat{j}$, then $\int_c \vec{f} \cdot d\mathbf{r}$, where c is the curve $y = 2 \text{ x}^2$, from $(0, 0)$ to $(1, 2)$; is $(1) \frac{5}{7}$ $(2) \frac{7}{5}$ $(3) \frac{-7}{6}$ $(4) \frac{-8}{3}$			

uestion No.	Questions
91.	Every skew-symmetric matrix of odd order is (1) Symmetric (2) Singular (3) Non-singular (4) Hermitian
92.	If r is the rank of the matrix A, then the number of linearly independent solutions of the equation $AX = 0$ in n variables, is (1) $n-r$ (2) $n-r-1$ (3) $r-1$ (4) n/r
93.	For the equation $x^8 + 5x^3 + 2x - 3 = 0$, least number of imaginary roots is (1) 4 (2) 5 (3) 6 (4) 2
94.	Characteristic roots of a Hermitian matrix are all (1) zero (2) imaginary (3) complex (4) real
95.	One root of the equation $ax^3 + bx^2 + cx + d = 0$ is equal to the sum of the other two if (1) $b^3 + 4abc + 8a^2d = 0$ (2) $b^2 + 4abc - 8a^2d = 0$ (3) $b^3 - 4abc + 8a^2d = 0$ (4) $b^3 - 4abc - 8a^2d = 0$
96.	value of K is (1) -1 (2) 1 (3) -2 (4) 2
97.	If $\frac{x^n - 2^n}{x - 2} = 80$ and n is a positive integer, then the value of n is (1) 2 (2) 3 (3) 4 (4) 5

Question No.	Questions
98.	Let $f(x) = \begin{cases} ax+1, & x \le 2 \\ 3ax+b, & 2 < x < 4 \\ 6, & x \ge 4 \end{cases}$ Values of a and b such that $f(x)$ is continuous everywhere, are
	(1) $\frac{-5}{8}$, $\frac{3}{2}$ (2) $\frac{5}{8}$, $\frac{-3}{2}$ (3) $\frac{5}{8}$, $\frac{3}{2}$ (4) $\frac{5}{3}$, $\frac{2}{3}$
99.	Derivative of $\cos^{-1} \sqrt{\frac{1+x}{2}}$, $0 \le x < 1$ is (1) $\frac{-2}{\sqrt{1-x^2}}$ (2) $\frac{-1}{2\sqrt{1-x^2}}$ (3) $-\frac{1}{\sqrt{1-x^2}}$ (4) $\frac{1}{2\sqrt{1-x^2}}$
100.	The radius of curvature P for the curve $xy = c$, c being constant, is (1) $(x^2 + y^2)^{-\frac{3}{2}}$ (2) $\frac{(x^2 + y^2)^{\frac{3}{2}}}{c}$ (3) $\frac{(x^2 + y^2)^{\frac{3}{2}}}{2c}$ (4) $\frac{(x^2 + y^2)^{\frac{3}{2}}}{2c}$

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(1	OO NOT OPEN THIS QUESTION BOOKLET BEFORETIME OR UNTIL YOU ARE ASKEDTO DO SO)
	(PG-EE-2016)
	Maths, Math with Computer Science Code
S	r. No. 11827
7	ime: 14 Hours Max. Marks: 100 Total Questions: 100
R	oll No(in figure)(in words)
N	ame:Father's Name:
N	Iother's Name : Date of Examination :
(Signature of the candidate) Signature of the Invigilator)
	ANDIDATES MUST READ THE FOLLOWING INFORMATION/
1	
2	The candidates must return the Question book-let as well as OMR answer-sheet
	to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her,
	in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3	. In case there is any discrepancy in any question(s) in the Question Booklet, the
	same may be brought to the notice of the Controller of Examinations in writing
	within two hours after the test is over. No such complaint(s) will be entertained thereafter.
- 4	The candidate MUST NOT do any rough work or writing in the OMR
	Answer-Sheet. Rough work, if any, may be done in the question book-let itself.
	Answers MUST NOT be ticked in the Question book-let.
. 6	one full mark. Cutting, erasing, overwriting and more than one answer
	in OMR Answer-Sheet will be treated as incorrect answer.
6	Use only Black or Blue BALL POINT PEN of good quality in the OMR Answer-Sheet.
7	BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD
	ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LETS. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL
	NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE
	EXAMINATION.

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Question No.	Questions							
1.	The equation $\frac{\partial^2 u}{\partial x^2} + 2 \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 2 \frac{\partial^2 u}{\partial x \partial y} + 2 \frac{\partial^2 u}{\partial y \partial z}$ is (1) Linear (2) Elliptic (3) Hyperbolic (4) Parabolic							
2.	Every given system of forces acting on a rigid body can be reduced to a (1) Couple (2) Screw (3) Wrench (4) Null force							
3.	Absolute units of moment in S.I. system is (1) Dyne centimeter (2) Gram centimeter (3) Kg. meter (4) Newton meter							
4.	For two equal forces acting on a particle, if square of their resultant is three times their product, then the angle between these forces is (1) $\frac{\pi}{2}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{6}$							
	A body is slightly displaced and still remains in equilibrium in any position, then such equilibrium is known as (1) Perfect equilibrium (2) Stable equilibrium (3) Neutral equilibrium (4) Natural equilibrium							
	A body of weight 4 kg. rests in equilibrium on an inclined plane whose slope is 30°. The co-efficient of friction is (1) $\sqrt{3}$ (2) $\frac{1}{\sqrt{2}}$ (3) $\frac{1}{\sqrt{3}}$ (4) $\frac{2}{\sqrt{3}}$							

Question No.	Questions
7.	The series $\frac{2p}{1^q} + \frac{3p}{2^q} + \frac{4p}{3^q} + \cdots$, where p and q are positive real numbers, is convergent if
	(1) $p < q - 2$ (2) $p < q - 1$ (3) $p > q$ (4) $p = q$
8.	The series $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n^5}$ is (1) Absolutely convergent (2) Divergent
	(1) Absolutely convergent (2) Divergent (3) Conditionally convergent (4) Oscillatory
9.	The limit superior and limit inferior of $\left\{\frac{(-1)^n}{n^2}\right\}$ are respectively equal to
	(1) 0,0 (2) 1,0 (3) 1,-1 (4) -1,0
10.	If the series $\sum_{n=1}^{\infty} a_n$ is convergent and the series $< b_n >$ is monotonic and bounded, then the series $\sum_{n=1}^{\infty} a_n b_n$ is convergent. This result is due to
	(1) Cauchy (2) Leibnitz (3) Dirichlet (4) Abel
11.	Sum of the series $\sinh x + \frac{\sinh 2x}{2} + \frac{\sinh 3x}{3} + \cdots \infty, \text{ is}$
	(1) $\frac{1}{2} (i\pi - x)$ (2) $\frac{1}{2} (i\pi + x)$ (3) $i\pi - x$ (4) $i\pi + x$
	(3) $i\pi - x$ (4) $i\pi + x$

Question No.	Questions
12.	An integrating factor of $x \frac{dy}{dx} + (3x+1) y = xe^{-2x}$, is
The same	(1) xe ^x (2) xe ^{2x}
	(3) xe^{3x} (4) $\frac{1}{2}xe^{-3x}$
13.	For the differential equation $\frac{d^2y}{dx^2} + ay = -4 \sin 2x$, if $y = x \cos 2x$ is a particular solution, then the value of a is
	(1) 4 (2) -4 (3) $\frac{1}{4}$ (4) $-\frac{1}{4}$
	(1) 4 (2) -4 (0) 4
14.	Orthogonal trajectories of the family of parabolas $y^2 = 4$ ax are (1) $2 x^2 + y^2 = c$ (2) $x^2 + 2 y^2 = c$
	(3) $x^2 = 4 \text{ ay } + c$ (4) $y^2 = 4 x + \frac{c}{a}$
15.	The differential equation of the type y = px + f (p) is known with the name (1) Euler (2) Lagrange (3) Clairaut (4) Cauchy
16.	The vector $(x+3y)\hat{i}+(y-2z)\hat{j}+(x+\lambda z)\hat{k}$ is solenoidal, then the value of
	λ is (1) 0 (2) -1 (3) 2 (4) -2
17.	Magnitude of maximum directional derivative of $\phi(x, y, z) = x^2 - 2y^2 + 4z^2$ at the point $(1, 1, -1)$ is
	(1) $\sqrt{21}$ (2) $2\sqrt{21}$
	(3) $3\sqrt{21}$ (4) $27/4$

Question No.	Questions							
18.	A particle moves along the curve $x=4\cos t,y=4\sin t,z=6t,\text{where }t\text{ is time. Magnitude of acceleration at time }t\text{ is}$							
p								
3	(1) 3 (2) ⁷ / ₂ (3) √5 (4) 4							
19.	Using Stoke's theorem, value of the integral ∫ (yzdx+xzdy+xydz),							
	where c is the curve $x^2 + y^2 = 1$, $z = y^2$; is (1) 0 (2) 1 (3) 2 (4) $\frac{7}{2}$							
20.	If $\vec{f} = 3 \text{ xy } \hat{i} - y^2 \hat{j}$, then $\int_{C} \vec{f} \cdot d\mathbf{r}$, where c is the curve $y = 2 \text{ x}^2$, from $(0, 0)$ to $(1, 2)$; is (1) $\frac{5}{7}$ (2) $\frac{7}{5}$ (3) $\frac{-7}{6}$ (4) $\frac{-8}{3}$							
21.	Every skew-symmetric matrix of odd order is (1) Symmetric (2) Singular (3) Non-singular (4) Hermitian							
22.	If r is the rank of the matrix A, then the number of linearly independen solutions of the equation AX = 0 in n variables, is							
	(1) n-r (3) r-1 (2) n-r-1 (4) n/r							
23.	For the equation $x^8 + 5x^3 + 2x - 3 = 0$, least number of imaginary roots in (1) 4 (2) 5 (3) 6 (4) 2							

Question No.	Questions							
24.	Characteristic roots of a Hermitian matrix are all							
	(1) zero (2) imaginary							
	(3) complex (4) real							
25.	One root of the equation $ax^3 + bx^2 + cx + d = 0$ is equal to the sum of the other two if							
	(1) $b^3 + 4 abc + 8 a^2d = 0$ (2) $b^2 + 4 abc - 8 a^2d = 0$							
	(3) $b^3 - 4 abc + 8 a^2 d = 0$ (4) $b^3 - 4 abc - 8 a^2 d = 0$							
26.	The roots of the equation $2 x^3 + 6 x^2 + 5 x + k = 0$ are in A. P. Then the value of K is							
Pale	(1) -1 (2) 1 (3) -2 (4) 2							
27.	(1) -1 (2) 1 (3) -2 (4) 2 If $\frac{x^n - 2^n}{x - 2} = 80$ and n is a positive integer, then the value of n is							
27.								
27.	If $\frac{x^n - 2^n}{x - 2} = 80$ and n is a positive integer, then the value of n is							
27.	If $\frac{x^n - 2^n}{x - 2} = 80$ and n is a positive integer, then the value of n is (1) 2 (2) 3							
27.	If $\frac{x^n - 2^n}{x - 2} = 80$ and n is a positive integer, then the value of n is (1) 2							
5407	If $\frac{x^n - 2^n}{x - 2} = 80$ and n is a positive integer, then the value of n is (1) 2							
5407	If $\frac{x^n-2^n}{x-2}=80$ and n is a positive integer, then the value of n is (1) 2							
5007	If $\frac{x^n - 2^n}{x - 2} = 80$ and n is a positive integer, then the value of n is (1) 2							

Question No.	Questions
29.	Derivative of $\cos^{-1}\sqrt{\frac{1+x}{2}}$, $0 \le x < 1$ is
	(1) $\frac{-2}{\sqrt{1-x^2}}$ (2) $\frac{-1}{2\sqrt{1-x^2}}$
- 5%	(3) $-\frac{1}{\sqrt{1-x^2}}$ (4) $\frac{1}{2\sqrt{1-x^2}}$
30.	The radius of curvature P for the curve xy = c, c being constant, is
	(1) $(x^2 + y^2)^{-\frac{3}{2}}$ (2) $\frac{(x^2 + y^2)^{\frac{3}{2}}}{c}$
15000	(3) $\frac{(x^2 + y^2)^{73}}{2c}$ (4) $\frac{(x^2 + y^2)^{72}}{2c}$
31.	In an inner product space V (F), the inequality $ (\alpha, \beta) \le \alpha \cdot \beta \forall \alpha, \beta \in V$,
	is called
	(1) Schwarz inequality
	(2) Triangle inequality
	(3) Bessel's inequality
	(4) Normal inequality
32.	If u and v are normal vectors in an inner product space V, then $\ \mathbf{u} - \mathbf{v}\ =$
	(1) 0 (2) 1 (3) 2 (4) $\sqrt{2}$
33.	Which of the following is a orthogonal set
	(1) $\{(1, 0, 1), (1, 0, -1), (0, 1, 0)\}$
	(2) {(1, 0, 1), (1, 0, -1), (-1, 0, 1)}
	(3) $\{(1, 0, 1), (1, 0, -1), (0, 2, 3)\}$
	1/25 1/2 25 25 1/2 1 6. 2 2 1/2

uestion No.		Questions
34.	The missing term in the table x 0 1 2 3 4	(3) 32 (4) 34
35.	The sum of eigen values of a so (1) $\frac{n}{2}$ (3) trace (A)	quare matrix A of order n is equal to $(2) \frac{n-1}{2}$ $(4) A $
36.	In Simpson's $\frac{3}{8}$ th rule, the interpolation (1) 2 (2) 1	erpolating polynomial is of degree (3) 4 (4) 3
37.	Root of the equation x ⁴ -12 x to 2, is (1) 1.92 (2) 1.95	(3) 2.05 (4) 2.15
38.	Which of the following is not co (1) $\Delta = (1 - \nabla)^{-1}$ (3) $E = 1 + \Delta$	rect (2) $1 - E^{-1} = \nabla$ (4) $\delta = E^{\frac{1}{2}} - E^{-\frac{1}{2}}$
	most probable limits are	g mean μ and standard deviation σ , the

Question No.	Questions								
40.	In Gauss quadrature formula, the range of integration is								
	(1) [0, 1] (2) [-1, 1]								
4	(3) [0, n] (4) [-1, 0]								
41.	The improper integral $\int_1^2 \frac{x}{\sqrt{x-1}} dx$ converges to								
	(1) $\frac{5}{3}$ (2) $\frac{8}{3}$ (3) $\frac{3}{8}$ (4) $\frac{3}{5}$								
42.	Which of the following statements is not true								
	(1) Every singleton set is connected in any metric space								
	(2) Empty set is connected in every metric space								
	(3) Every subset having at least two points of a metric space is not								
	connected								
	1 March 1997								
	(4) None of these								
43.	1 March 1997								
43.	(4) None of these								
43.	(4) None of these $\int_{1}^{\infty} \frac{\sin x}{x^{m}} dx \text{ converges absolutely if}$								
	(4) None of these $\int_{1}^{\infty} \frac{\sin x}{x^{m}} dx \text{ converges absolutely if}$ (1) $m < 1$ (2) $m > 1$ (3) $m = 0$ (4) $m \le 1$								
	(4) None of these $\int_{1}^{\infty} \frac{\sin x}{x^{m}} dx \text{ converges absolutely if}$ (1) $m < 1$ (2) $m > 1$ (3) $m = 0$ (4) $m \le 1$ A totally bounded metric space is								
	(4) None of these $\int_{1}^{\infty} \frac{\sin x}{x^{m}} dx \text{ converges absolutely if}$ (1) $m < 1$ (2) $m > 1$ (3) $m = 0$ (4) $m \le 1$ A totally bounded metric space is (1) Compact (2) Complete								
44.	(4) None of these \[\sum_{i}^{\infty} \frac{\sin x}{x^{m}} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \								

Question No.				11-11-	Ques	tions			- 13
46.	For a	Cantor	's tern	ary set, v				not correct	
+	(1)	It is clos	sed			It is unco			
	(3)	It is der	ise		(4)	It is perf	ect set	(A)	
47.	Let f be a bounded function defined on the bounded interval [a, b]. Then f is Riemann integrable on [a, b] iff								
					(2)	$\int^b f \leq f_a^{\overline{b}}$	f		
	(3)	$\int\limits_a^b f \geq f_a^{\bar{b}}$ $\int\limits_a^b f < f_a^{\bar{b}}$	f		(4)	$\int_{a}^{b} f \le f_{a}^{\bar{b}}$ $\int_{a}^{b} f = f_{a}^{\bar{b}}$	f	3 10	RE
48.	If G	is a non	-abelia	an group	of order	125, the	n O (Z (G)) is	100
33	(1)	25	(2)	125	(3)	5	(4)	10	
49.	The	number	r of abo	elian grou	ips upto	isomorp	hism of	order 10 ⁵ i	8
	(1)	50	(2)	49	(3)		(4)	39	
50.	The	numbe	r of ge	nerators	of a fini	te group	of order	53 are	
	(1)		(2)	52		54	(4)	52	
51.				n value t		is used o	n the fu	nction f (x	= x (x - 1)
				3/2		2/3	(4)	3/4	
52.								$\frac{\partial(\mathbf{u}, \mathbf{v})}{\partial(\mathbf{r}, \mathbf{\theta})} =$	
	(1)	-4r3	(2)	$-4r^2$	(3)	$-2 r^3$	(4)	-3r ²	

Question No.	Questions
58.	Partial differential equation obtained by eliminating the arbitrary constants a and b from the relation $2z = (ax + y)^2 + b$, is
	(1) $px + qy = q^2$ (2) $py + qx = q^2$
	(3) $px + qy = p^2$ (4) $py + qx = p^2$
59.	Solution of px + qy = 3 z is
	(1) $f\left(\frac{y}{x}, \frac{x^2}{z}\right) = 0$ (2) $f\left(\frac{y}{x}, \frac{x^3}{z}\right) = 0$
	(3) $f\left(\frac{x}{y}, \frac{x^2}{z}\right) = 0$ (4) $f\left(\frac{x}{y}, \frac{x^3}{z}\right) = 0$
60.	P.I. of the partial differential equation $(D^2 - 2 DD^l + D^{r^2}) z = 12 xy$, is
	(1) $2 x^3 y + x^4$ (2) $2 x^3 y + y^3$
	(1) $2 x^3 y + x^4$ (2) $2 x^3 y + y^3$ (3) $2 x^3 y + 3 x^2$ (4) $2 x^3 y + 3 x^4$
61.	The number of prime ideals of Z ₁₀ is
	(1) 2 (2) 4 (3) 5 (4) 10
62.	If $f: G \to G'$ is group homomorphism, then f is one-one if Kernel f is
	(1) Empty (2) Singleton set
	(3) Any set (4) Set of identity element
63.	An ideal S of a commutative ring R with unity is maximal iff R/S is
	(1) Anideal
	(2) A vector space
	(3) A ring
	(4) A field

Question No.	Questions				
64.	Which of the following statements is false (1) Every field is a ring (2) Every finite integral domain is a field (3) Every field is an integral domain (4) Every integral domain is a field				
65.	A person weighing 70 kg. is in a lift ascending with an acceleration of 1.4 m/sec ² . The thrust of his feet on the lift (in Newton) is (1) 784 N (2) 780 N (3) 692 N (4) 980 N				
66.	The horizontal range of a projectile is three times the greatest height, the angle of projection is (1) $\tan^{-1}\frac{3}{2}$ (2) $\tan^{-1}\frac{2}{3}$ (3) $\tan^{-1}\frac{4}{3}$ (4) $\tan^{-1}\frac{3}{4}$				
67.	(1) $F \alpha \frac{1}{r^2}$ (2) $F \alpha \frac{1}{r^3}$ (3) $F \alpha \frac{1}{r^4}$ (4) $F \alpha \frac{1}{r^5}$				
68.	If θ be the angle which the tangent at a point makes with the radius vector, then the relation between angular velocity w and linear velocity v is (1) $w = vr$ (2) $w = \frac{v \cos \theta}{r}$ (3) $w = \frac{v \sin \theta}{r}$ (4) $w = vr \sin \theta$				

Question No.	Questions Two particles of mass m and 4 m are moving with equal momentum. The ratio of their kinetic energies is (1) 1:2 (2) 2:1 (3) 1:4 (4) 4:1				
69.					
70.	Kepler law of motion says that each planet describes an ellipse having the sum at its (1) Focus (2) Centre (3) Origin (4) Outer cover				
71.	A particle describes the cycloid $s=4$ a $\sin\psi$ with uniform speed v . The acceleration at any point is (1) $\frac{v^2}{4a}$ (2) $\frac{v^2}{\sqrt{s^2-16\ a^2}}$ (3) $\frac{v^2}{\sqrt{16\ a^2-s^2}}$ (4) $\frac{v^2}{\sqrt{a^2-s^2}}$				
72.	$\int_{0}^{2} (8 - x^{3})^{-\frac{1}{3}} dx =$ (1) $\frac{1}{3} \beta \left(\frac{1}{3}, \frac{3}{2}\right)$ (2) $\frac{1}{3} \beta \left(\frac{1}{3}, \frac{2}{3}\right)$ (3) $\frac{2}{3} \beta \left(\frac{1}{3}, \frac{2}{3}\right)$ (4) $\beta \left(\frac{1}{3}, \frac{2}{3}\right)$				
73.	$\Gamma(n)\Gamma(1-n) =$ (1) $\frac{\pi}{\sin n\pi}$ (2) $\frac{\sin n\pi}{\pi}$ (3) $\frac{n\pi}{\sin n\pi}$ (4) $\frac{2\pi}{\sin n\pi}$				

Question No.	Questions
79.	If V and W are vector spaces, then a linear transformation T from V to W is isomorphism if it is (1) into (2) one-one (3) onto (4) orthogonal
80.	If W = { (a, b, c, d) : $b + c + d = 0$ } is a subspace of R ⁴ , then dim W is (1) 4 (2) 3 (3) 2 (4) 1
81.	Oblique asymptotes to the curve $y^2 (x-2 a) = x^3 - a^3$ are (1) $y \pm x + 2 a = 0$ (2) $x \pm y + 2 a = 0$ (3) $x \pm y + a = 0$ (4) $y \pm x + a = 0$
82.	Area between the parabolas $x^2 = 4$ ay and $y^2 = 4$ ax is (1) $\frac{3}{8} a^2$ (2) $\frac{8}{3} a^2$ (3) $\frac{16}{3} a^2$ (4) $\frac{16}{5} a^2$
83.	$\int_{0}^{1} x^{6} \sqrt{1 - x^{2}} dx =$ (1) $5\pi/32$ (2) $5\pi/16$ (3) $3\pi/128$ (4) $3\pi/32$
84.	Co-ordinates of the centre of the conic $8 x^2 - 24 xy + 15 y^2 + 48 x - 48 y = 0$, are (1) (4, 3) (2) (3, 4) (3) (3, 2) (4) (2, 3)

Question		Code-(
No.	Questions	
85.	Radius of the sphere	
	$x^2 + y^2 + z^2 - 4x + 6y - 8z + 4 = 0$ is	
	(1) 3 (2) 4 (3) 4/7 (4) 5	
86.	The condition that the plane $ax + by + cz = 0$ cuts the cone xy	î
	Porpendicular lines, 18	+ yz + zx =
	(1) $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 1$ (2) $\frac{1}{a} + \frac{2}{b} + \frac{3}{c} = 0$	
	(3) $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$ (4) $a + b + c = 0$	0
	Value of $\tan \left(i \log \frac{a - ib}{a + ib}\right)$ is 1) $\frac{ab}{a^2 - b^2}$ (2) $\frac{2 ab}{a^2 - b^2}$	
	1) $\frac{ab}{a^2 - b^2}$ (2) $\frac{2 ab}{a^2 - b^2}$	
(3) $\frac{2 \text{ ab}}{\left(a^2 - b^2\right)^2}$ (4) $\frac{4 \text{ ab}}{a^2 - b^2}$	
88. W	Thich of the following congruences have solution	177 24
(1	$x^2 \equiv 2 \pmod{59}$ (2) $x^2 \equiv -2 \pmod{59}$	
	$x^2 \equiv 2 \pmod{61}$ (4) $x^2 \equiv -2 \pmod{61}$	
89. If	$\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$, then $x =$	N 44
(1)	$\frac{1}{2}$ (2) $\frac{1}{3}$	
(3)	$\frac{1}{2}$ (2) $\frac{1}{3}$ $\frac{4}{7}$ (4) $\frac{1}{6}$	

uestion No.		Questions
90.	If $\cosh x = 2$, then $x =$ (1) $\log \left(2 - \sqrt{5}\right)$	(2) $\log \left(2-\sqrt{3}\right)$
	(3) $\log (2 + \sqrt{5})$	$(4) \log \left(2 + \sqrt{3}\right)$
91.	$\left\{ J_{\frac{1}{2}}(x) \right\}^2 + \left\{ J_{-\frac{1}{2}}(x) \right\}^2 =$	
	(1) $\frac{\pi x}{2}$ (2) $\frac{x}{2\pi}$	$(3) \frac{2}{\pi x} \qquad (4) \frac{\pi}{2x}$
92.	If the Hermite polynom (1) x (2) 2 x	ial of degree n is denoted by $H_n(x)$, then $H_1(x)$
93.	$\int_{0}^{\infty} t e^{-2t} \cos t dt =$	
	(1) $\frac{3}{16}$ (2) $\frac{9}{16}$	(3) $\frac{3}{25}$ (4) $\frac{9}{25}$
94.	$\bar{L}^{1}\left\{\frac{1}{\left(s-4\right)^{3}}\right\} =$	
	$(1) \frac{1}{4} \operatorname{te}^{3t}$	(2) $\frac{1}{4} t^2 e^{4t}$
	(1) $\frac{1}{4} te^{3t}$ (3) $\frac{1}{2} te^{4t}$	(2) $\frac{1}{4} t^2 e^{4t}$ (4) $\frac{1}{2} t^2 e^{4t}$

Question No.		Que	stions			
95.	Fourier transform of the function $f(t) = \begin{cases} e^{-at}, & t > 0, a > 0 \\ 0, & t < 0 \end{cases}$ is	tion				
20	(1) $\frac{1}{a+is}$ (2) $\frac{\pi}{a+is}$	(3)	$\frac{a}{\pi + is}$	(4)	πa 1+is	
96.	Given that int $x = 1$, $y = 4$; x = + + x +y; Then the value of x is					
- 75	(1) 4 (2) 5	(3)	6	(4)	7	
97.	The continue statement cann	ot be	used with			
	(1) do (2) while	(3)	for	(4)	switch	
98.	The expression $(*p) \cdot x$ is equ. (1) $*p \rightarrow x$		nt to p → x			
	(3) p → ·x	(4)	p = x			
99.	The result of the expression (1) 5 (2) 4	21	3.7 (int) 9	-3 is (4)	7.3	
100.	The condition for covergence root α is				aphson metho	d to a
	(1) $\frac{\mathbf{f}'(\alpha)}{\mathbf{f}''(\alpha)} < 0$ (3) $\frac{\mathbf{f}'(\alpha)}{\mathbf{f}''(\alpha)} > 1$		$\frac{f'(\alpha)}{f''(\alpha)} < 1$ $\frac{f'(\alpha)}{f''(\alpha)} < 2$			o e

purpole on 5/7/Kat 12:32Pm (DO NOT OPEN THIS QUESTION BOOKLET BEFORETIME OR UNTIL YOU ARE ASKED TO DO SO) (PG-EE-2016) Maths, Math with Computer Science Code 1828 **Total Questions: 100** Max. Marks: 100 Time: 14 Hours (in words) (in figure) Roll No. Father's Name: Name: Date of Examination : __ Mother's Name: (Signature of the Invigilator) (Signature of the candidate) CANDIDATES MUST READ THE FOLLOWING INFORMATION/ INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER. 1. All questions are compulsory. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated. 3. In case there is any discrepancy in any question(s) in the Question Booklet, the

In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing within two hours after the test is over. No such complaint(s) will be entertained thereafter.

4. The candidate MUST NOT do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers MUST NOT be ticked in the Question book-let.

 There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.

6. Use only Black or Blue BALL POINT PEN of good quality in the OMR Answer Sheet.

7. BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LETS. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

stion lo.		Questions	
-	Obligue asymptotes to the	e curve $y^2 (x-2 a) = x^3 - a^3 are$	
1.	(1) $y \pm x + 2 a = 0$		
	(2) $x \pm y + 2 a = 0$		
	$(3) \mathbf{x} \pm \mathbf{y} + \mathbf{a} = 0$		
	$(4) y \pm x + a = 0$	4+ pritty 4= 111 111	-
0	Area between the parabo	olas $x^2 = 4$ ay and $y^2 = 4$ ax is	
2.		(2) $\frac{8}{3}$ a ²	
	(1) $\frac{3}{8}a^2$		
	(3) $\frac{16}{3}$ a ²	(4) $\frac{16}{5}$ a ²	
	(3) 3 4	3	
3.	$\int_{-1}^{1} e^{x^{2}} dx =$		
٥.	$\int_0^1 x^6 \sqrt{1 - x^2} dx =$ (1) $5\pi/32$	==/	
	(1) 5 T/20	(2) $5\pi/16$	
		(4) $3\pi/32$	
	(3) 3 [#] / ₁₂₈	(4) /32	1
4.	Co-ordinates of the cer	ntre of the conic	
	8 x ² - 24 xy + 15 y ² + 45	$8 \times -48 y = 0$, are	
HM		(2) (3, 4)	
	(1) (4, 3)	(4) (2, 3)	
	(3) (3, 2)		
5	. Radius of the sphere		
	$x^2 + y^2 + z^2 - 4x + 6y$	-8z + 4 = 0 is	
	(1) 3	(2) 4	
	(1) 4	(4) 5	
1	(3) 4/7	(4)	

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Question No.	uner	Questions	1000
6.	The condition that the plane a		
÷	(1) $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 1$	(2) $\frac{1}{a} + \frac{2}{b} + \frac{3}{c} = 0$	
3	(3) $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$	(4) $a + b + c = 0$	
7.	Value of $\tan \left(i \log \frac{a-ib}{a+ib}\right)$ is	tabe a service territoria	115 01
	$(1) \frac{ab}{a^2 - b^2}$	(2) $\frac{2 \text{ ab}}{a^2 - b^2}$	1 2 10 f (m)
	(3) $\frac{2 \text{ ab}}{\left(a^2 - b^2\right)^2}$	$(4) \frac{4 \text{ ab}}{a^2 - b^2}$	
8.	Which of the following congru	ences have solution	10 miles
	$(1) x^2 \equiv 2 \pmod{59}$	$(2) x^2 \equiv -2 \pmod{59}$	
	$(3) x^2 \equiv 2 \pmod{61}$	(4) $x^2 \equiv -2 \pmod{61}$	A LUXSHADA
9.	If $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$, th		
	(1) $\frac{1}{2}$	(2) $\frac{1}{3}$	6 A) (0)
	(3) $\frac{4}{7}$	(4) $\frac{1}{6}$	O'Houself A
10.	If $cosh x = 2$, then $x =$		
E .	(1) $\log \left(2-\sqrt{5}\right)$	(2) $\log (2 - \sqrt{3})$	8-07
	(3) $\log\left(2+\sqrt{5}\right)$	(4) $\log (2 + \sqrt{3})$	36 440

Question No.	Questions
11.	In an inner product space V (F), the inequality $ (\alpha, \beta) \le \alpha \cdot \beta \forall \alpha, \beta \in V$, is called (1) Schwarz inequality (2) Triangle inequality (3) Bessel's inequality (4) Normal inequality
12.	If u and v are normal vectors in an inner product space V, then $\ \mathbf{u} - \mathbf{v}\ = (1) \ 0 \ (2) \ 1 \ (3) \ 2 \ (4) \ \sqrt{2}$
13.	Which of the following is a orthogonal set (1) {(1, 0, 1), (1, 0, -1), (0, 1, 0)} (2) {(1, 0, 1), (1, 0, -1), (-1, 0, 1)} (3) {(1, 0, 1), (1, 0, -1), (0, 2, 3)} (4) None of these
14.	The missing term in the table x 0 1 2 3 4
15.	The sum of eigen values of a square matrix A of order n is equal to (1) $\frac{n}{2}$ (2) $\frac{n-1}{2}$ (3) trace (A) (4) $ A $

Contesto

Question No.	Questions
16.	In Simpson's $\frac{3}{8}$ th rule, the interpolating polynomial is of degree (1) 2 (2) 1 (3) 4 (4) 3
17.	Root of the equation $x^4 - 12 x + 7 = 0$ which is approximately equal to 2, is (1) 1.92 (2) 1.95 (3) 2.05 (4) 2.15
18.	Which of the following is not correct (1) $\Delta = (1 - \nabla)^{-1}$ (2) $1 - E^{-1} = \nabla$ (3) $E = 1 + \Delta$ (4) $\delta = E^{\frac{1}{2}} - E^{-\frac{1}{2}}$
19.	For a normal distribution having mean μ and standard deviation σ , the most probable limits are $(1) \mu \pm \sigma \qquad \qquad (2) \mu \pm 2 \sigma$ $(3) \mu \pm \frac{3}{2} \sigma \qquad \qquad (4) \mu \pm 3 \sigma$
20.	In Gauss quadrature formula, the range of integration is (1) $\begin{bmatrix} 0, 1 \end{bmatrix}$ (2) $\begin{bmatrix} -1, 1 \end{bmatrix}$ (3) $\begin{bmatrix} 0, n \end{bmatrix}$ (4) $\begin{bmatrix} -1, 0 \end{bmatrix}$
21.	The number of prime ideals of Z_{10} is $(1) 2 \qquad (2) 4 \qquad (3) 5 \qquad (4) 10$
22.	 If f:G→G' is group homomorphism, then f is one-one if Kernel f is (1) Empty (2) Singleton set (3) Any set (4) Set of identity element

Question No.			Que	stions			
23.	Anid	An ideal S of a commutative ring R with unity is maximal iff R/S is					
	(1)	An ideal	(2)	A vector space			
	(3)	A ring	(4)	A field	184		
24.	Whic	h of the followi	ng statements	s false			
	(1)	Every field is a	ring				
	(2)	Every finite int	tegral domain is	a field			
T will	(3)	Every field is a	n integral doma	in			
	(4)	Every integral	domain is a fiel	d			
25.	A per	rson weighing	70 kg. is in a li	ft ascending wit	th an acceleration of		
	1.4 m/sec ² . The thrust of his feet on the lift (in Newton) is						
	(1)	784 N	(2)	780 N			
	(3)	692 N	(4)	980 N			
26.	The horizontal range of a projectile is three times the greatest height,						
	the a	ngle of projecti	ion is				
	(1)	$\tan^{-1}\frac{3}{2}$	(2)	$\tan^{-1}\frac{2}{3}$			
-		4					
	(3)	$\tan^{-1}\frac{4}{3}$	(4)	tan-1 3 4			
27.	The l	aw of force tow	vards the pole u	nder the curve	$r^2 = 2$ ap is		
	(1)	$F \alpha \frac{1}{v^2}$	(2)	$F \alpha \frac{1}{r^3}$			
	N I						
	(3)	$F \alpha \frac{1}{r^4}$	(4)	$F \alpha \frac{1}{r^5}$			
		T.		I'			

Question No.		Questions	
34.	$\bar{L}^1 \left\{ \frac{1}{\left(s-4\right)^3} \right\} =$		
	(1) $\frac{1}{4} \text{ te}^{3t}$ (2) $\frac{1}{4} t^2 e^{4t}$	(3) $\frac{1}{2} te^{4t}$ (4)	$\frac{1}{2}t^2e^{4t}$
35.	Fourier transform of the fun	ction	
	$f(t) = \begin{cases} e^{-at}, & t > 0, a > 0 \\ 0, & t < 0 \end{cases}$ is		
	(1) $\frac{1}{a+is}$ (2) $\frac{\pi}{a+is}$	$(3) \frac{a}{\pi + is} \qquad (4)$	πa 1+is
36.	Given that int $x = 1$, $y = 4$; x = + + x +y; Then the value of x is		Part III
	(1) 4 (2) 5	(3) 6 (4)	7
37.	The continue statement cann	ot be used with	
	(1) do (2) while	70x 4	switch
38.	The expression (*p) x is equi	valent to	
	$(1) *p \to x$	(2) $p \rightarrow x$	
	(3) p → ·x	(4) $p = x$	
39.	The result of the expression (17 * 4) % (int) 9-3 is	e militar
	(1) 5	(2) 4	
	(3) 3.7	(4) 7.3	

Question No.	Questions									
40.	The condition for covergence of the Newton - Raphson method to a									
	root α iš									
*	(1) $\frac{f'(\alpha)}{f''(\alpha)} < 0$ (2) $\frac{f'(\alpha)}{f''(\alpha)} < 1$									
	(3) $\frac{f'(\alpha)}{f''(\alpha)} > 1$ (4) $\frac{f'(\alpha)}{f''(\alpha)} < 2$									
41.	If Lagrange's mean value theorem is used on the function $f(x) = x(x-1)$									
	in [1, 2], then the value of 'c' is									
	(1) $\frac{1}{2}$ (2) $\frac{3}{2}$ (3) $\frac{2}{3}$ (4) $\frac{3}{4}$									
42.	If $u = 2 xy$, $v = x^2 - y^2$, $x = r \cos \theta$, $y = r \sin \theta$, then $\frac{\partial (u, v)}{\partial (r, \theta)} =$ $(1) -4r^3 \qquad (2) -4r^2 \qquad (3) -2r^3 \qquad (4) -3r^2$									
	(1) $-4r^3$ (2) $-4r^2$ (3) $-2r^3$ (4) $-3r^2$									
43.	If $u = f(x + 2y) + g(x - 2y)$, then $4\frac{\partial^2 u}{\partial x^2} =$									
	28-									
	$(1) -\frac{\partial^2 \mathbf{u}}{\partial \mathbf{y}^2} \qquad (2) \frac{\partial^2 \mathbf{u}}{\partial \mathbf{y}^2}$									
	(3) $2\frac{\partial^2 u}{\partial x^2}$ (4) $-2\frac{\partial^2 u}{\partial y^2}$									
	$(3) 2\frac{\partial^2 \mathbf{u}}{\partial \mathbf{y}^2} \qquad (4) -2\frac{\partial \mathbf{u}}{\partial \mathbf{y}^2}$									
-	If $u = \log (x^2 + xy + y^2)$ then $u \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$									
44										
1	(1) 0 (2) -1									
	(2) 1 (4) 2									

Question No.	Questions									
45.	The envelope of the family of curves $(x - a)^2 + y^2 = 4$ a, a being the parameter; is (1) $x^2 = 4 (y + 1)$ (2) $x^2 = 2 (x + 1)$ (3) $y^2 = 4 (x + 1)$ (4) $y^2 = -4 (x + 1)$									
46.	The locus of centre of curvature for a curve is called its (1) envelope (2) evolute (3) torsion (4) characteristic									
47.	$\lim_{x \to 0} \frac{\left(\tan^{-1} x\right)^{2}}{\log\left(1 + x^{2}\right)} =$ (1) 0 (2) $\frac{1}{2}$ (3) 1 (4) $\frac{3}{2}$									
48.	Partial differential equation obtained by eliminating the arbitrary constants a and b from the relation $2z = (ax + y)^2 + b$, is (1) $px + qy = q^2$ (2) $py + qx = q^2$ (3) $px + qy = p^2$ (4) $py + qx = p^2$									
49.	Solution of px + qy = 3 z is (1) $f\left(\frac{y}{x}, \frac{x^2}{z}\right) = 0$ (2) $f\left(\frac{y}{x}, \frac{x^3}{z}\right) = 0$ (3) $f\left(\frac{x}{y}, \frac{x^2}{z}\right) = 0$ (4) $f\left(\frac{x}{y}, \frac{x^3}{z}\right) = 0$									
50.	P.I. of the partial differential equation $(D^2 - 2 DD^1 + D^{r^2}) z = 12 xy$, is (1) $2 x^3 y + x^4$ (2) $2 x^3 y + y^3$ (3) $2 x^3 y + 3 x^2$ (4) $2 x^3 y + 3 x^4$									

Question No.	Questions
51.	Sum of the series $\sinh x + \frac{\sinh 2x}{2} + \frac{\sinh 3x}{3} + \cdots \infty, \text{ is}$
3	(1) $\frac{1}{2} (i\pi - x)$ (2) $\frac{1}{2} (i\pi + x)$
	(3) $i\pi - x$ (4) $i\pi + x$
52.	An integrating factor of $x \frac{dy}{dx} + (3x+1) y = xe^{-2x}$, is
	(1) xe^{x} (2) xe^{2x}
	(3) xe^{3x} (4) $\frac{1}{2}xe^{-3x}$
53.	For the differential equation $\frac{d^2y}{dx^2} + ay = -4 \sin 2x$, if $y = x \cos 2x$ is a particular solution, then the value of a is (1) 4 (2) -4
	(3) $\frac{1}{4}$ (4) $-\frac{1}{4}$
54.	Orthogonal trajectories of the family of parabolas $y^2 = 4$ ax are (1) $2 x^2 + y^2 = c$ (2) $x^2 + 2 y^2 = c$
	(3) $x^2 = 4 \text{ ay } + c$ (4) $y^2 = 4 x + \frac{c}{a}$
55.	The differential equation of the type $y = px + f(p)$ is known with the name
	(1) Euler (2) Lagrange (3) Clairaut (4) Cauchy

Question No.	Questions									
56.	The vector $(x+3y) \hat{i} + (y-2z) \hat{j} + (x+\lambda z) \hat{k}$ is solenoidal, then the value of λ is (1) 0 (2) -1 (3) 2 (4) -2									
57.	Magnitude of maximum directional derivative of $\phi(x, y, z) = x^2 - 2 y^2 + 4 z^2 \text{ at the point } (1, 1, -1) \text{ is}$ (1) $\sqrt{21}$ (2) $2\sqrt{21}$									
	(3) $3\sqrt{21}$ (4) $2\frac{7}{4}$									
58.	A particle moves along the curve $x = 4 \cos t$, $y = 4 \sin t$, $z = 6 t$, where t is time. Magnitude of acceleration at time t is (1) 3 (2) $\frac{7}{2}$ (3) $\sqrt{5}$ (4) 4									
59.	Using Stoke's theorem, value of the integral $\oint_C (yzdx + xzdy + xydz)$, where c is the curve $x^2 + y^2 = 1$, $z = y^2$; is									
	(1) 0 (2) 1 (3) 2 (4) $\frac{7}{2}$									
	If $\vec{f} = 3 \times y \hat{i} - y^2 \hat{j}$, then $\int \vec{f} \cdot dr$, where c is the curve $y = 2 \times^2$, from $(0, 0)$ to									

Question No.	Questions										
61.	The equation $\frac{\partial^2 u}{\partial x^2} + 2 \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 2 \frac{\partial^2 u}{\partial x \partial y} + 2 \frac{\partial^2 u}{\partial y \partial z}$ is										
9	(1) Linear (2) Elliptic										
	(3) Hyperbolic (4) Parabolic										
62.	Every given system of forces acting on a rigid body can be reduced to a										
	(1) Couple (2) Screw										
	(3) Wrench (4) Null force										
63.	Absolute units of moment in S.I. system is										
All the	(1) Dyne centimeter (2) Gram centimeter										
	(3) Kg. meter (4) Newton meter										
64.	For two equal forces acting on a particle, if square of their resultant i										
1	three times their product, then the angle between these forces is										
	(1) $\frac{\pi}{2}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{6}$										
65.	A body is slightly displaced and still remains in equilibrium in any position then such equilibrium is known as										
	(1) Perfect equilibrium (2) Stable equilibrium										
	(3) Neutral equilibrium (4) Natural equilibrium										
66.	A body of weight 4 kg. rests in equilibrium on an inclined plane whose slope is 30°. The co-efficient of friction is										
	(1) $\sqrt{3}$ (2) $\frac{1}{\sqrt{2}}$ (3) $\frac{1}{\sqrt{3}}$ (4) $\frac{2}{\sqrt{3}}$										

Question No.	Questions										
67.	The series $\frac{2p}{1^q} + \frac{3p}{2^q} + \frac{4p}{3^q} + \cdots$, where p and q are positive real number.										
	is convergent if (1) p < q - 2	(2) p < q - 1									
	(3) p > q	(4) $p = q$									
68.	The series $\sum_{n=1}^{\infty} \frac{\left(-1\right)^{n-1}}{n^5}$ is										
	(1) Absolutely convergent	(2) Divergent									
	(3) Conditionally convergent	(4) Oscillatory									
69.	The limit superior and limit in	ferior of $\left\{\frac{(-1)^n}{n^2}\right\}$ are respectively equal to									
	(1) 0,0	(2) 1, 0									
	(3) 1, -1	(4) -1, 0									
70.	If the series $\sum_{n=1}^{\infty} a_n$ is convergen	nt and the series < b, > is monotonic an									
101.29	bounded, then the series $\sum_{n=1}^{\infty} a_n l$	b _n is convergent. This result is due to									
	(1) Cauchy	(2) Leibnitz									
	(3) Dirichlet	(4) Abel									
V 1											
71.	The improper integral $\int_1^2 \frac{x}{\sqrt{x-1}}$	dx converges to									

Question No.	Questions								
72.	Which of the following statements is not true (1) Every singleton set is connected in any metric space (2) Empty set is connected in every metric space (3) Every subset having at least two points of a metric space is no connected (4) None of these								
73.	$\int_{1}^{\infty} \frac{\sin x}{x^{m}} dx \text{ converges absolutely if}$ (1) m < 1 (2) m > 1 (3) m = 0 (4) m < 1								
74.	A totally bounded metric space is (1) Compact (2) M > 1 (3) m = 0 (4) m ≤ 1 (1) Compact (2) Complete (3) Separable (4) Everywhere dense								
75.	If the set A is open and the set B is closed in R ⁿ , then (1) B-A is closed (2) B-A is open (3) B-A is semi-open (4) B-A is null set								
	For a Cantor's ternary set, which of the following is not correct (1) It is closed (2) It is uncountable (3) It is dense (4) It is perfect set								
	Let f be a bounded function defined on the bounded interval [a, b]. Then f is Riemann integrable on [a, b] iff (1) $\int_a^b f \ge f_a^{\overline{b}} f$ (2) $\int_a^b f \le f_a^{\overline{b}} f$ (3) $\int_a^b f < f_a^{\overline{b}} f$ (4) $\int_a^b f = f_a^{\overline{b}} f$								
	If G is a non-abelian group of order 125, then O (Z (G)) is 1) 25 (2) 125 (3) 5 (4) 10								

D

Question		Questions
No.		
79.	The number of abelian gr	oups upto isomorphism of order 10 ⁵ is
	(1) 50 (2) 49	(3) 45 (4) 39
80.	The number of generators	s of a finite group of order 53 are
	(1) 53 (2) 52	(3) 54 (4) 52
81.	Every skew-symmetric m	atrix of odd order is
	(1) Symmetric	(2) Singular
	(3) Non-singular	(4) Hermitian
82.	If r is the rank of the matr solutions of the equation A	ix A, then the number of linearly independent $X = 0$ in n variables, is
	(1) n-r	(2) $n-r-1$
	(3) r−1	(4) n/r
83.	For the equation $x^8 + 5x^3 +$	$2 \times -3 = 0$, least number of imaginary roots i
	(1) 4 (2) 5	(3) 6 (4) 2
84.	Characteristic roots of a He	ermitian matrix are all
- 8	(1) zero	(2) imaginary
3	(3) complex	(4) real
85.	One root of the equation ax other two if	$a^3 + bx^2 + cx + d = 0$ is equal to the sum of the
((1) $b^3 + 4 abc + 8 a^2 d = 0$	
(2) $b^2 + 4 abc - 8 a^2 d = 0$	
(3) $b^3 - 4 abc + 8 a^2 d = 0$	
1	4) $b^3 - 4 abc - 8 a^2 d = 0$	

Question No.	Questions
86.	The roots of the equation $2 x^3 + 6 x^2 + 5 x + k = 0$ are in A. P. Then the value of K is
	(1) -1 (2) 1 (3) -2 (4) 2
87.	If $\frac{x^n - 2^n}{x - 2} = 80$ and n is a positive integer, then the value of n is
	(1) 2 (2) 3 (3) 4 (4) 5
	$\begin{cases} ax+1, & x \le 2 \\ 0 & x \le 2 \end{cases}$
88.	Let $f(x) = \begin{cases} 3 ax + b , 2 < x < 4 \\ 6 , x \ge 4 \end{cases}$
	Values of a and b such that f (x) is continuous everywhere, are
	(1) $\frac{-5}{8}$, $\frac{3}{2}$ (2) $\frac{5}{8}$, $\frac{-3}{2}$
100	(3) $\frac{5}{8}$, $\frac{3}{2}$ (4) $\frac{5}{3}$, $\frac{2}{3}$
89.	Derivative of $\cos^{-1}\sqrt{\frac{1+x}{2}}$, $0 \le x < 1$ is
19	(1) $\frac{-2}{\sqrt{1-x^2}}$ (2) $\frac{-1}{2\sqrt{1-x^2}}$
inda je o	(3) $-\frac{1}{\sqrt{1-x^2}}$ (4) $\frac{1}{2\sqrt{1-x^2}}$
90.	The radius of curvature P for the curve xy = c, c being constant, is
	$(1) - (x^2 + y^2)^{-\frac{3}{2}} $ (2) $\frac{(x^2 + y^2)^{\frac{3}{2}}}{c}$
	(1) $(x^2 + y^2)^{-\frac{3}{2}}$ (2) $\frac{(x^2 + y^2)}{c}$ (3) $\frac{(x^2 + y^2)^{\frac{2}{3}}}{2c}$ (4) $\frac{(x^2 + y^2)^{\frac{3}{2}}}{2c}$

Question No.	Questions										
91.	A particle describes the cycloid $s = 4$ a $\sin \psi$ with uniform speed v. The acceleration at any point is										
	(1) $\frac{v^2}{4a}$ (2) $\frac{v^2}{\sqrt{s^2 - 16 a^2}}$										
	(3) $\frac{v^2}{\sqrt{16 a^2 - s^2}}$ (4) $\frac{v^2}{\sqrt{a^2 - s^2}}$										
92.	$\int_0^2 (8-x^3)^{-\frac{1}{8}} dx =$										
	(1) $\frac{1}{3} \beta \left(\frac{1}{3}, \frac{3}{2} \right)$ (2) $\frac{1}{3} \beta \left(\frac{1}{3}, \frac{2}{3} \right)$										
	(3) $\frac{2}{3} \beta \left(\frac{1}{3}, \frac{2}{3}\right)$ (4) $\beta \left(\frac{1}{3}, \frac{2}{3}\right)$										
93.	$\Gamma(n)\Gamma(1-n)=$										
	(1) $\frac{\pi}{\sin n\pi}$ (2) $\frac{\sin n\pi}{\pi}$										
	$(3) \frac{n\pi}{\sin n\pi} \qquad \qquad (4) \frac{2\pi}{\sin n\pi}$										
	If Fourier co-efficient of f (t) are Cn, then Fourier co-efficients of										
	f(t) are										
	(1) \overline{C}_n										
	(2) C-n										
	(3) -\overline{\mathbb{C}}_n										
	(4) $-\overline{C}_{-n}$										

estion	Questions									
No. 95.	By changing the order of integers of integers of integers of $\frac{3a}{4}$ (3) $\frac{4\pi a}{3}$	gration, the value of $\int_0^a \int_y^a \frac{x dx dy}{x^2 + y^2} =$ (2) $\frac{3\pi a}{4}$ (4) $\frac{\pi a}{4}$								
96.	Given that f(z) = 2 x² + y + i (y satisfied at (1) the line x = 2 y (3) every point of z-plane	(2) the line y = 2 x (4) no point of z-plane								
97.	Image of $ z-2i = 2$ under the condition of $ z-2i = 2$ under t	(2) $4u + 1 = 0$ (4) $4u - 1 = 0$								
98.	(3) z = 2	(2) $z = 3$ (4) $z = 1$								
99.	is isomorphism if it is (1) into (3) onto	s, then a linear transformation T from V to V (2) one-one (4) orthogonal								
100). If $W = \{ (a, b, c, d) : b + c + (1) $ 4 (2) 3	$d = 0$ is a subspace of R^4 , then dim W is (3) 2 (4) 1								

1.	2	16.	3	31.	2	46.	3	61.	2	76.	3	91.	1
2.	1	17.	2	32.	1	47.	2	62.	4	77.	4	92.	4
3.	3	18.	2	33.	2	48.	1	63.	2	78.	3	93.	1
4.	4	19.	4	34.	4	49.	1	64.	3	79.	4	94.	2
5.	3	20.	4	35.	3	50.	4	65.	1	80.	1	95.	3
6.	1	21.	1.	36.	2	51.	3	66.	3	81.	3	96.	4
7.	4	22.	3	37.	3	52.	2	67.	4	82.	2	97.	3
8.	2	23.	1	38.	1	53.	3	68.	3	83.	1	98.	1
9.	2	24.	1	39.	4	54.	4	69.	2	84.	2	99.	4
0.	4	25.	3	40.	1	55.	1	70.	2	85.	4	100.	2
1.	3	26.	4	41.	4	56.	2	71.	1	86.	2		
2.	3	27.	2	42.	3	57.	4	72.	1	87.	1		
3.	1	28.	4	43.	4	58.	2	73.	4	88.	3		
4.	2	29.	1	44.	2	59.	1	74.	4	89.	3		
5.	4	30.	3	45.	3	60.	3	75.	1	90.	2		

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3.	4	18.	2	33.	1	48.	1	63.	1	78.	1	93.	3
4.	4	19.	1	34.	2	49.	4	64.	2	79.	1	94.	4
5.	1	20.	3	35.	4	50.	2	65.	4	80.	4	95,	3
6.	3	21.	2	36.	3	51.	2	66.	2	81.	1	96.	1
7,	4	22.	1	37.	2	52.	4	67.	1	82.	3	97.	4
8.	3	23.	2	38.	2	53.	2	68,	3	83.	1	98.	2
9.	4	24.	4	39.	4	54.	3	69.	3	84.	1	99.	2
10.	1	25.	3	40.	4	55.	1	70.	2	85.	3	100.	4
11.	3	26.	2	41.	1	56.	3	71.	4	86.	4		
12.	2	27.	3	42.	4	57.	4	72.	3	87.	2		
13.	3	28.	1	43.	1	58.	3	73.	4	88.	4		
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	3.	4	18.	4	33.	1	48.	3	63.	4	78.	3	93.	3
	4.	2	19.	1	34.	2	49.	2	64.	4	79.	3	94.	4
	5.	3	20.	3	35.	3	50.	2	65.	1	80.	2	95.	1
	6.	3	21.	2	36.	4	51.	2	66.	3	81.	3	96.	2
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	9.	1	24.	4	39.	4	54.	4	69.	4	84.	2	99.	1
	10.	4	25.	3	40.	2	55.	3	70.	1	85.	4	100.	3
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	12.	3	27.	4	42.	4	57.	3	72.	2	87.	2		
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