Module Name : PhD Mathematics-E
Exam Date : 20-Sep-2020 Batch : 16:00-18:00

Sr. No.	Client Question ID	Question Body and Alternatives	Marks	Negative Marks
Objective Question				
1	1	Let f : S → T be continuous function between metric spaces and X be a subset of S. (i) If X is compact then f(X) is compact. (ii) If X is connected then f(X) is connected. A1 : Both (i) and (ii) are true. A2 : (i) is true but (ii) is not true. A3 : (ii) is true but (i) is not true. A4 : Neither (i) nor (ii) is true.	4.0	1.00
Objective Question				
2	2	For any elements a, b in a group G (i) $(aba^{-1})^n = ab^na^{-1}$ (ii) $(ab)^n = a^nb^n$ A1 : Both (i) and (ii) are true. A2 : (i) is true but (ii) is not true. A3 : (ii) is true but (i) is not true. A4 : Neither (i) nor (ii) is true.	4.0	1.00
Objective Question				
3	3	Let G be a finite group and for an element a of G let C(a) denote the conjugate class of a. (i) C(a) is a subgroup of G (ii) order of C(a) divides order of G. (iii) distinct conjugate classes are disjoint and all of their union is G. A1 : All (i) , (ii) and (iii) are true A2 : Both (i) and (ii) are true but (iii) is not true. A3 : Both (i) and (iii) are true but (ii) is not true. A4 Both (ii) and (iii) are true but (i) is not true.	4.0	1.00

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Objective Question				
4	4	Suppose a group G contains elements a and b with o(a) = 4 , o(b) = 2 and $a^3b = ba$. Then o(ab) is equal to A1 : 2 A2 : 4 A3 : 6 A4 : 8	4.0	1.00
Objective Question				
5	5	Let f: G → H be a group homomorphism. Suppose e is identity element of G. Then f(e) is identity element of H A1 : only if f is an isomorphism. A2 : only if f is injective, but need not be isomorphism. A3 : only if f is surjective, but need not be isomorphism. A4 : is a true statement.	4.0	1.00
Objective Question				
6	6	Let G be a finite group. Then the product of all elements of G is equal to identity element A1 : if G is a cyclic group any order. A2 : if G is a cyclic group of even order, but it is not true if G is of odd order. A3 : if G is abelian group of odd order, but it is not true if G is of even order. A4 : is always a true statement.	4.0	1.00
Objective Question				
7	7	Let G be a finite group of order n. Then the statement that for a divisor d of n, G has a subgroup of order d A1 : is always true. A2 : is true only if d is a prime number A3 is true if d is a power of a prime number.	4.0	1.00

		: A4 : is true if if d is a product of distinct primes.		
Objective Question				
8	8	(i) An abelian group of order 32 is cyclic. (ii) An abelian group of order 210 is cyclic. A1 : Both (i) and (ii) are true. A2 : (i) is true but (ii) is not true. A3 : (ii) is true but (i) is not true. A4 : Neither (i) nor (ii) is true.	4.0	1.00
Objective Question				
9	9	Let R be a commutative ring with identity. Then cancellation law with respect to multiplication holds (i) if R has no zero divisors. (ii) if R is a finite ring. A1 : Both (i) and (ii) are true. A2 : (i) is true but (ii) is not true. A3 : (ii) is true but (i) is not true. A4 : Neither (i) nor (ii) is true.	4.0	1.00
Objective Question				
10	10	Which one is not a correct statement? A1 : R[x] is an integral domain if R is an integral domain. A2 : R[x] is an Euclidean domain if R is an Euclidean domain. A3 : R[x] is unique factorization domain if R is a unique factorization domain A4 : R[x] is principal ideal domain if R is a field.	4.0	1.00
Objective Question				
11	11	Let f(x) be a polynomial with integer coefficients. (i) If f(x) is reducible over Z then it is reducible over Q. (ii) If f(x) is reducible over Q then it is reducible over Z.	4.0	1.00

		A1: Both (i) and (ii) are true. A2: (i) is true but (ii) is not true. A3: (ii) is true but (i) is not true. A4: Neither (i) nor (ii) is true.		
Objective Question				
12	12	If n is a prime then the polynomial (i) $(n+1)\, x^n+n^n\, x^{n-1}+n^{n-1}\, x^{n-2}+...+n^2\, x+n$ is irreducible over Z. (ii) $x^{n-1}+x^{n-2}+....+x+1$ is irreducible over Z. A1: Both (i) and (ii) are true. A2: (i) is true but (ii) is not true. A3: (ii) is true but (i) is not true. A4: Neither (i) nor (ii) is true.	4.0	1.00
Objective Question				
13	13	The ring $Z[\sqrt{-5}]$ is A1: not an integral domain. A2: integral domain but not an unique factorization domain. A3: unique factorization domain but not an Euclidean domain. A4: Euclidean domain but not a field.	4.0	1.00
Objective Question				
14	14	$Q[x]/(x^5-5)$ A1: is not an integral domain. A2: is an integral domain but not a field. A3: is a field. A4 Is a finite ring.	4.0	1.00

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Objective Question				
15	15	Let f(x) be a polynomial over a infinite field F. Then A1 : f(x) has all its roots in F. A2 : there exists a finite extension of F in which f(x) has all its roots in it. A3 : There may not be a finite extension but there exists an infinite extension in which f(x) has all roots in it. A4 : There need not be any field extension of F in which f(x) has all roots in it.	4.0	1.00
Objective Question				
16	16	Let a and b be two distinct roots of the polynomial $3x^4 – 4x^3 +2x^2 – 6$. A1 : Q[a] is equal to Q[b] A2 : Q[a] need not equal to Q[b] but Q[a] is isomorphic to Q[b]. A3 : Q[a] need not be isomorphic to Q[b] but [Q[a] : Q] = [Q[b] : Q]. A4 : [Q[a] : Q] need not equal to [Q[b] : Q].	4.0	1.00
Objective Question				
17	17	Let f be a function from E to R^m , where E is a open subset of R^n and f is differentiable at a point x in E. Then the derivative f'(x) is A1 : a scalar A2 : an element of $L(R^m, R^m)$ A3 : an element of $L(R^n, R^m)$ A4 : an element of $L(R^m, R^n)$	4.0	1.00
Objective Question				
18	18	Let f be a function from E to R^n , where E is a open subset of R^n and f is differentiable on E. If for a point x in E, f'(x) is invertible linear operator then A1 : f is invertible on E. A2 : f is invertible on some open subset of E containing x.	4.0	1.00

		A3 : f is invertible on an open subset of E not containing x. A4 : f need not be invertible on any infinite subset of E.		
Objective Question				
19	19	Let a be an element in an infinite extension of a field F. (i) a is algebraic over F if a is contained in a finite extension of F. (ii) If a is not algebraic over F then, F(a) is an infinite extension of F. A1 : Both (i) and (ii) are true. A2 : (i) is true but (ii) is not true. A3 : (ii) is true but (i) is not true. A4 : Neither (i) nor (ii) is true.	4.0	1.00
Objective Question				
20	20	Let G be a finite group with order of G is $p^k m$ where p does not divide m, then which one of the statementt is not correct? A1 : Any two sub groups of G with order p are isomorphic. A2 : Any two subgroups of order p^k are isomorphic. A3 : There exists unique subgroup of order p^k. A4 : For every r, less than or equal to k, there exists a subgroup of order pp^r..	4.0	1.00
Objective Question				
21	21	Any group of order 77 is A1 : cyclic. A2 : abelian but not cyclic. A3 : not abelian. A4 : a group with non trivial center.	4.0	1.00
Objective Question				
22	22	Let M be an ideal of a commutative ring R with identity such that the quotient ring R/M has only one proper ideal, then A1 : M is a zero ideal.	4.0	1.00

		A2 : M = R. A3 : M is not properly contained in any proper ideal of R. A4 : M is not closed under multiplication.		
Objective Question				
23	23	Let R be an integral domain. Then which one of the following statement is not possible. A1 : R contains a subring isomorphic to the quotient ring Z/pZ for some prime number p. A2 : R contains a subring isomorphic to Z. A3 : There exists an integer n and an element a in R such that n.a = 0. A4 : Every prime ideal of R is non trivial.	4.0	1.00
Objective Question				
24	24	Let R be a commutative ring with identity and f(x) in R[x] with degree n. A1 : Then f(x) has exactly n roots in R. A2 : f(x) may have more than n roots in R. A3 : f(x) has at least one root in R. A4 : f(x) has at least one root in the quotient field of R.	4.0	1.00
Objective Question				
25	25	The last digit of 2^{100} is A1 : 2 A2 : 4 A3 : 6 A4 : 8	4.0	1.00
Objective Question				
26	26	$\lim_{x\to\infty}\frac{\log x}{x}=$	4.0	1.00

A1 : 1

A2 : 0

A3 : ∞

A4 : Positive Finite real number other than 1.

Objective Question

27	27	Which of the following real valued function is not Riemann integrable on [0,2]. A1 : f(x)= sinx A2 : f(x)=[x], the absolute value of x A3 : f(x)=$\begin{cases} 0\ if\ x\ is\ \text{rational} \\ 1\ if\ x\ is\ \text{irrational} \end{cases}$ A4 : f is continuous at almost every point in [0,2]	4.0	1.00

Objective Question

28	28	Define $f(x) = \begin{cases} x^2 \sin\frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$. Then A1 : f is differentiable at every point in R except 0 A2 : f is differentiable at every point in R including 0 A3 : f is differentiable at every point x in R such that |x|>10 A4 : f is nowhere differentiable.	4.0	1.00

Objective Question

29	29	Which of the following is/are not possible. (i) The image of a continuous real valued function on a compact metric space is the whole R. (iI) We can find a function *f* which is differentiable at every point of [0,2] such that f'(x) takes only the value 0 and 1. (iII) The continuous image of a real valued function on a connected metric space is an interval. (iv) Every separable metric space is second countable. A1 : (i) and (ii) A2 : (i)	4.0	1.00

		A3 : (ii) A4 : (i) and (iv)		

Objective Question

30	30	Sequence $\left\{\frac{\sin n}{n}\right\}$ A1 : Converge to 1 A2 : Converge to 0 A3 : Oscillates A4 : Diverge to infinity.	4.0	1.00

Objective Question

31	31	Which of the following series converge absolutely? A1 : $1-\frac{1}{1!}+\frac{1}{2!}-\frac{1}{3!}+\frac{1}{4!}-\cdots$ A2 : $1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\frac{1}{5}-\cdots$ A3 : $\frac{1}{2}-\frac{2}{4}+\frac{3}{6}-\frac{4}{8}+\cdots$ A4 : $1-1+\frac{1}{2}-\frac{1}{2}+\frac{1}{3}-\frac{1}{3}+\cdots$	4.0	1.00

Objective Question

32	32	Which of the following is/ are true? (i) Any rearrangement of absolutely convergent series converge to a unique limit. (ii) Rearrangement of series cannot converge to different limits. (iii) Rearrangement of series can converge to any given real number. (iv) Rearrangement of series can converge to at most finite number of limits. A1 : (iii) A2 : (ii) A3 : (iii) and (iv) A4 : (i) and (iii)	4.0	1.00

Objective Question

33	33	How many real valued functions can one define on R such that f(x) is irrational if x is rational and f(x) is rational if x is irrational?	4.0	1.00

		A1 : Only finite A2 : Countable infinite A3 : Uncountable A4 : Zero		

Objective Question

34	34	A subset A of a topological space X has empty boundary if and only if A1 : X is compact. A2 : A is open. A3 : A is open and closed. A4 : A is closed and X is compact.	4.0	1.00

Objective Question

35	35	Let X be the set of all real number with the topology consisting of the empty set together with all subsets of X whose complements are finite. Then any infinite subset of X is A1 : dense. A2 : dense and so is its complement. A3 : open. A4 : closed.	4.0	1.00

Objective Question

36	36	Let X be a compact space, Y be a metric space and f be a continuous function from X into Y. Then A1 : f is open. A2 : f is bijective. A3 : f (X) is finite. A4 : f(X) is bounded.	4.0	1.00

Objective Question				
37	37	Which of the following is false? A1 : All projections are both open and closed. A2 : All projections are open but may not be closed. A3 : All projections are neither open nor closed. A4 : All projections are closed but may not be open.	4.0	1.00
Objective Question				
38	38	Which of the following is true? A1 : Every metric space is a compact Hausdorff space. A2 : Every compact Hausdorff space is a metric space. A3 : Every Hausdorff space is a normal space. A4 : Every metric space is a normal space.	4.0	1.00
Objective Question				
39	39	If G is a regular bipartite graph then A1 : G is 2-factorable. A2 : G is 1-factorable. A3 : G has a cut vertex. A4 : G has a cut edge.	4.0	1.00
Objective Question				
40	40	If G is simple graph whose chromatic number is 120 then A1 : Independence number of G cannot be more than 121. A2 : the number of edges in G is at least $\binom{20}{2}$. A3 : maximum degree of G is at most 118.	4.0	1.00

		A4: there exist a clique of size 20.		

Objective Question

41	41	If G is k-critical, then A1: $\delta \le k-1$ A2: $\delta \ge k-1$ A3: $\Delta \le k-1$ A4: G contains a cut vertex	4.0	1.00

Objective Question

42	42	Let $S = \left\{\frac{1}{n} : n \in N\right\} \cup \{0\}$ *and* $T = \left\{n + \frac{1}{n} : n \in N\right\}$ be the subsets of the metric space R with the usual metric. Then A1: S is complete but not T A2: T is complete but not S A3: both S and T are complete A4: neither T nor S is complete	4.0	1.00

Objective Question

43	43	Let A and B be fuzzy sets, and the operation $\wedge$ on fuzzy sets defined by A1: $\mu_A(x) \wedge \mu_B(x) = \max\{\mu_A(x), \mu_B(x)\}$ A2: $\mu_A(x) \wedge \mu_B(x) = \min\{\mu_A(x), \mu_B(x)\}$ A3: $\mu_A(x) \wedge \mu_B(x) = \lvert \mu_A(x) - \mu_B(x) \rvert$ A4: $\mu_A(x) \wedge \mu_B(x) = 0$	4.0	1.00

Objective Question

44	44	The algebraic sum of fuzzy set A and B is defined by A1: $\mu_{A+B}(x) = \mu_A(x) + \mu_B(x)$	4.0	1.00

		A2: $\mu_{A+B}(x) = \mu_A(x)\mu_B(x)$ A3: $\mu_{A+B}(x) = \mu_A(x) + \mu_B(x) - \mu_A(x)\mu_B(x)$ A4: $\mu_{A+B}(x) = \mu_A(x) + \mu_B(x) + \mu_A(x)\mu_B(x)$		

Objective Question

45	45	The radius of convergence of the power series $\sum_{n=0}^{\infty} \frac{(2n)!}{(n!)^2}(z-3i)^n$ is A1: 1/4 A2: 4 A3: 1 A4: 1/2	4.0	1.00

Objective Question

46	46	For the function $\frac{1}{(2\sin z-1)^2}$ A1: z=0 is a simple pole A2: z=0 is a removable singularity A3: $\frac{\pi}{6}$ is a pole of order 2 A4: $\frac{\pi}{3}$ is a pole of order 2	4.0	1.00

Objective Question

47	47	If k(G) and k'(G) denotes the vertex connectivity and edge connectivity of a graph G then k(G)=k'(G) if A1: G is a simple graph with only even degree vertices. A2: G is a simple graph whose maximum degree is at most 4. A3: G is a simple 3-regular graph. A4: G is Hamiltonian.	4.0	1.00

Objective Question

48	48	For a simple connected graph G, which of the following statement is wrong?	4.0	1.00

		A1: An edge of G is not a cut edge iff it belongs to a cycle. A2: G is 3-edge connected iff each edge of G is exactly the intersection of two cycles. A3: If G is critical then no vertex cut is a clique. A4: If $\alpha(G)$ denotes the independence number of G then, $\frac{n}{\alpha(G)} \le \chi(G) \le n-\alpha(G)-1$.		

Objective Question

49	49	Every convergent sequence in a topological space X has a unique limit if A1: X is a T_1-space. A2: X is a compact space. A3: X is a Hausdorff space. A4: X is a second countable space.	4.0	1.00

Objective Question

50	50	Let T_1 be the usual topology on R. Define another topology T_2 on R by T_2={A⊆R | A is either countable or empty or whole of R}. Then Z is A1: Closed in (R, T_1) but not in (R, T_2) A2: Closed in (R, T_2) but not in (R, T_1) A3: Closed in both (R, T_1) and (R, T_2) A4: Closed neither in (R, T_1) nor in (R, T_2)	4.0	1.00

Objective Question

51	51	The function $f(x,y)=(e^x\cos y, e^x\sin y)$ from R^2 to R^2 is A1: One to one mapping . A2: one to one on some neighbourhood of any point in R^2 . A3: an Onto Map A4: such that some neighbourhood of any point surjects on to R^2	4.0	1.00

Objective Question				
52	52	The function $f(z=x+iy)=x^2y+3i$ is A1 : differentiable everywhere A2 : not differentiable anywhere. A3 : differentiable only at the origin A4 : differentiable at every point on the imaginary axis	4.0	1.00
Objective Question				
53	53	Let $f:[a,b] \to R$ be a bounded function where $a,b \in R$ with $a < b$. Then f is Riemann integrable if and only if f is continuous everywhere on $[a,b]$ except on A1 : a set of positive measure A2 : a set measure zero A3 : a finite number of points A4 : a countably infinite number of points	4.0	1.00
Objective Question				
54	54	Which of the following is TRUE? A1 : l_1 is a Hilbert space A2 : l_∞ is separable A3 : l_2 is not separable A4 : Every orthonormal set in a separable Hilbert space is atmost countable.	4.0	1.00
Objective Question				
55	55	Which of the following is TRUE? A1 : Every subset of R with finite outer measure is Lebesgue measurable A2 : Every Lebesgue measurable set is bounded. A3 : Every set of finite measure is a subset of some closed and bounded interval.	4.0	1.00

		A4 : There are uncountably many nonmeasurable subsets of [0,1] .		
Objective Question				
56	56	Which of the following statement is TRUE? A1 : Every measurable function defined on [0,1] is continuous. A2 : Every measurable function defined on [0,1] is Riemann integrable over [0,1]. A3 : Every measurable function on [0,1] is monotone. A4 : Every monotone function defined on [0,1] is measurable.	4.0	1.00
Objective Question				
57	57	The Cantor set is A1 : Nonmeasurable A2 : Dense in [0,1] A3 : Countable subset of [0,1] A4 : A compact subset of [0,1]	4.0	1.00
Objective Question				
58	58	Which of the following statement is FALSE ? A1 : Every measurable subset of R can be written as a union of countably many measurable sets each of which has finite measure. A2 : Every measurable subset of R can be written as a union of countably many measurable sets each of which has measure less than 1. A3 : Every measurable set of finite measure can be written as a union of countably many measurable sets each of which has measure less than 1. A4 : Every measureable set of finite measure can be written as a union of a countable number of sets each of which has measure zero	4.0	1.00
Objective Question				
59	59	Which of the following statement is FALSE? A1 : The pointwise limit of a sequence of measurable functions defined on [0,1] is measurable. A2 : The pointwise limit of a sequence of continuous functions functions defined on [0,1] is measurable	4.0	1.00

		A3: The pointwise limit of a sequence of differentiable functions defined on [0,1] is differentiable A4: The uniform limit of a sequence of bounded functions defined on [0,1] is bounded.		

Objective Question

60	60	Which of the following statement is FALSE? A1: Every metric space is first countable A2: A metric space is separable iff it is second countable A3: Any subset of a separable metric space is separable A4: Every metric space is second countable	4.0	1.00

Objective Question

61	61	Which of the following statement is FALSE? A1: In a topological space any subset is either open or closed. A2: There exists a topological space in which every subset is both open and closed. A3: There exists a topological space in which every sequence converge to every point in the space. A4: There exists a topological space in which the convergent sequences are only eventually constant sequences.	4.0	1.00

Objective Question

62	62	Let X be any nonempty set. Consider the following two statements: (i) Given any collection $\mathcal{F}$ of subsets of a set X, there exists a unique topology τ on X having $\mathcal{F}$ as a base. (ii) If $\mathcal{B}$ is a base for the topology τ on a set X then $\mathcal{B}$ is closed with reference to finite intersection. Then A1: Both (i) and (ii) are true. A2: (i) is true but (ii) is false. A3: (ii) is true but (i) is false. A4: Both (i) and (ii) are false.	4.0	1.00

Objective Question

63	63	Let X and Y be two nonempty sets. Then which of the following statements is FALSE?	4.0	1.00

		A1: If τ_1 is a topology on X and τ_2 is a topology on Y then $\{U \times V \mid U \in \tau_1 \text{ and } V \in \tau_2\}$ is a topology on $X \times Y$. A2: If τ_1 is a topology on X and τ_2 is a topology on Y then $\{U \times V \mid U \in \tau_1 \text{ and } V \in \tau_2\}$ form a base for some topology on $X \times Y$. A3: If τ_1 is a topology on X and τ_2 is a topology on Y then the strips $\{U \times Y \mid U \in \tau_1\} \cup \{X \times V \mid V \in \tau_2\}$ form a subbase for the product topology on $X \times Y$. A4: If $\mathcal{B}_X$ is a base for (X, τ_X) and $\mathcal{B}_Y$ is a base for the space (Y, τ_Y) then $\{B_1 \times B_2 \mid B_1 \in \mathcal{B}_X \text{ and } B_2 \in \mathcal{B}_Y\}$ form a base for the product topology on $X \times Y$.		
Objective Question				
64	64	Let (X, τ_X) and (Y, τ_Y) be a topological spaces and let $A \subset X$. Which of the following statement is TRUE? A1: Then $f: X \to Y$ is continuous at every point of A iff the restricted map $f\|_A : A \to Y$ is continuous. A2: Let τ be any topology on $X \times Y$. Then a sequence $(x_n, y_n) \overset{\tau}{\to} (x, y)$ if $x_n \overset{\tau_X}{\to} x$ and $y_n \overset{\tau_Y}{\to} y$. A3: If the topological space X is second countable then X has a countable dense subset. A4: A map $f: (X, \tau_X) \to (Y, \tau_Y)$ is continuous at $x \in X$ iff for any sequence $x_n \to x$ in X we have that the sequence $f(x_n) \to f(x)$ in Y.	4.0	1.00
Objective Question				
65	65	Let (X, τ_X) and (Y, τ_Y) be topological spaces. Which of the following is FALSE? A1: If (X, τ_X) and (Y, τ_Y) are Hausdorff then $(X \times Y, \tau_{prod})$ is Hausdorff. A2: If (X, τ_X) and (Y, τ_Y) are regular then $(X \times Y, \tau_{prod})$ is regular A3: If (X, τ_X) and (Y, τ_Y) are normal then $(X \times Y, \tau_{prod})$ is normal A4: If (X, τ_X) and (Y, τ_Y) are compact then $(X \times Y, \tau_{prod})$ is compact.	4.0	1.00
Objective Question				
66	66	Consider the following functions f and g defined as follows: $f: R_l \to R$ defined as $f(x) = 2x + 1$, where R_l is the real line with the lower limit topology. $g: R_{fc} \to R$ defined as $g(x) = 2x + 1$, where R_{fc} is the real line with finite complement topology. Then A1: *f* is continuous but *g* is not continuous A2: *g* is continuous but *f* is not continuous A3: both *f* and *g* are continuous	4.0	1.00

		A4: Neither f nor g is continuous		

Objective Question

67	67	Let $f: [0,1] \to R$ be a function. Then which of the following statements is FALSE? A1: f is absolutely continuous on $[0,1] \Rightarrow f$ is uniformly continuous on [0,1] A2: f is absolutely continuous on $[0,1] \Rightarrow f$ is of bounded variation on [0,1] A3: f is of bounded variation on $[0,1] \Rightarrow f$ is continuous on [0,1] A4: f is of bounded variation on $[0,1] \Rightarrow f$ is bounded on [0,1]	4.0	1.00

Objective Question

68	68	Let $f: [0,1] \to R$ be a function of bounded variation on$[0,1]$. Then which of the following statements is TRUE? A1: f is continuous. A2: f is monotone. A3: f is differentiable and the derivative function f' is bounded. A4: f can be written as a difference of two monotonically increasing functions on [0,1].	4.0	1.00

Objective Question

69	69	Let X be a nonzero normed linear space over K. Then which of the following statement is FALSE ? A1: Every non-zero linear functional $f: X \to K$ is an open map. A2: If $f: X \to K$ is a linear functional then $Ker(f)$ is a closed subset of X. A3: If $x_0(\neq 0) \in X$, then there exists a continuous linear functional $f: X \to K$ such that $f(x_0) = 1$. A4: If $x_0(\neq 0) \in X$, then there exists a continuous linear functional $f: X \to K$ such that $f(x_0) = \|x_0\|$.	4.0	1.00

Objective Question

70	70	Consider the sequence of functions $f_n: [0,1] \to R$ defined as $f_n(x) = x^n$. Then which of the following statements is TRUE? A1: The sequence (f_n) is uniformly convergent on $[0,1]$	4.0	1.00

		A2 : The sequence (f_n) is not uniformly convergent on $[0,1]$ but it has a subsequence that is uniformly convergent on $[0,1]$ A3 : The sequence (f_n) is equicontinuous on $[0,1]$. A4 : For any $0 < \delta < 1$ the sequence (f_n) is uniformly convergent on the interval $[0,1-\delta]$		

Objective Question

71	71	Which of the following statement is TRUE? A1 : The dual of a separable normed linear space is separable. A2 : On every vector space X over R or C there exists a norm with respect to which X is a Banach space. A3 : Every continuous linear functional f defined on a subspace Y of a normed space X has a unique continuous linear extension to the whole of X. A4 : A linear functional $f: X \to K$ defined on a normed linear space X, is continuous if and only if $Ker(f)$ is a closed subspace of X.	4.0	1.00

Objective Question

72	72	A metric space *(X,d)* is totally bounded if and only if A1 : Every sequence in *X* has a Cauchy subsequence A2 : Every sequence in *X* has a convergent subsequence A3 : Every sequence in *X has a bounded subsequence* A4 : Every bounded sequence in *X* has a convergent subsequence	4.0	1.00

Objective Question

73	73	Let $X = C[0,1] = \{f: [0,1] \to R \mid f \text{ is continuous}\}$. Consider the following norms defined on X. If $f \in X$ then $\|f\|_1 = \int_0^1 \|f(t)\| dt$ and $\|f\|_\infty = \text{Sup}_{x\in[0,1]} \|f(x)\|$. Which of the following statement is TRUE? A1 : Both $(X, \|.\|_1)$ and $(X, \|.\|_\infty)$ are complete. A2 : $(X, \|.\|_1)$ is complete but $(X, \|.\|_\infty)$ is not complete. A3 : $(X, \|.\|_\infty)$ is complete but $(X, \|.\|_1)$ is not complete. A4 : Neither $(X, \|.\|_1)$ nor $(X, \|.\|_\infty)$ is complete.	4.0	1.00

Objective Question				
74	74	The Sequence space l_p is a Hilbert space if and only if A1: $p=1$ A2: $p>1$ A3: $p=2$ A4: $p=\infty$	4.0	1.00
Objective Question				
75	75	The subnormal of a fuzzy set A is =? A1: height (A) =1 A2: height (A)<1 A3: height (A)>1 A4: height (A) ≤ 1	4.0	1.00
Objective Question				
76	76	The general solution of $x^4y'''+2x^3y''-x^2y'+xy=1$ is A1: $(c_1+c_2\log x)x+\frac{c_3}{x}+\frac{1}{4x}\log x$ A2: $(c_1+c_2\log x)x+2\log x+4$ A3: $(\frac{c_1}{x}+c_2\log x)x+c_3x^2+\log x$ A4: $(c_1+c_2x^2\log x)x+c_3x+1\log x$	4.0	1.00
Objective Question				
77	77	If J_n is a Bessel's function then $(x\,J_n\,J_{n+1})$ is equal to A1: $xJ^2{}_n$ A2: $xJ^2{}_{n+1}$ A3: $x(J^2{}_n+J^2{}_{n+1}$	4.0	1.00

		A4: $x(J^2_n - J^2_{n+1}$		
Objective Question				
78	78	If $A = \begin{pmatrix} 1 & 0 & 0 \\ i & \frac{-1+i\sqrt{3}}{2} & 0 \\ 0 & 1+2i & \frac{-1-i\sqrt{3}}{2} \end{pmatrix}$, then the trace of A^{102} is A1: 0 A2: 1 A3: 2 A4: 3	4.0	1.00
Objective Question				
79	79	Which of the following matrices is NOT diagonalizable? A1: $\begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix}$ A2: $\begin{pmatrix} 1 & 0 \\ 3 & 2 \end{pmatrix}$ A3: $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ A4: $\begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$	4.0	1.00
Objective Question				
80	80	The operation on fuzzy set A $CON(A) = A^2 = \{x, (\mu_A(x))^2\}$ is called ______________ A1: Concatenation on fuzzy set A2: Conflict on fuzzy set A3: Control on fuzzy set A4: None of these	4.0	1.00
Objective Question				
81	81		4.0	1.00

		The minimal polynomial associated with the matrix $\begin{pmatrix} 0 & 0 & 3 \\ 1 & 0 & 2 \\ 0 & 1 & 1 \end{pmatrix}$ is A1 : $x^3 - x^2 - 2x - 3$ A2 : $x^3 - x^2 + 2x - 3$ A3 : $x^3 - x^2 - 3x - 3$ A4 : $x^3 - x^2 + 3x - 3$		
Objective Question				
82	82	If A= $\begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$ the sum and product of the eigen values of A are... A1 : 12,32 A2 : -12,32 A3 : -12,-32 A4 : None of these	4.0	1.00
Objective Question				
83	83	If A= $\begin{pmatrix} 3 & 0 & 0 \\ 5 & 4 & 0 \\ 3 & 6 & 1 \end{pmatrix}$ the eigen values of 5A and A^5 are respectively.... A1 : 15,20,5; 15,20,5 A2 : 3,4,1; 3,4,1 A3 : $15, 20, 5; 3^5, 4^5, 1^5$ A4 : $3, 5, 3; 3^5, 5^5, 3^5$	4.0	1.00
Objective Question				
84	84	The quadratic form of the matrix $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ is A1 : $x^2 + y^2$	4.0	1.00

		A2: $2xy$ A3: x^2+2xy A4: $(x+y)^2$		

Objective Question

85	85	The Taylor series of $f(z)=\frac{1}{(z-2)(z-3)}$ in powers of (z-i) has radius of convergence A1: $\sqrt{5}$ A2: $\sqrt{10}$ A3: $\sqrt{2}$ A4: $\sqrt{3}$	4.0	1.00

Objective Question

86	86	If $f(x)=\begin{cases}\sin\frac{1}{x} & if \quad x\neq 0\\ 0 & if \quad x=0\end{cases}$ $A^+=\{x\in[0,1]:f(x)=1\}$ and $A^-=\{x\in[0,1]:f(x)=-1\}$ then , A1: A^+ and A^- are both empty sets. A2: A^+ and A^- are finite sets. A3: $A^+ \cup A^-=[0,1]$ A4: A^+ and A^- are infinite sets.	4.0	1.00

Objective Question

87	87	If $w(z)=z^2$ is the complex potential in the first quadrant then the streamlines are A1: hyperbolas A2: ellipses A3: parabolas A4: straight lines	4.0	1.00

Objective Question				
88	88	If the Helmholtz-Hodge decomposition is $\vec{w} = \vec{u} + \nabla p$ then A1 : $\vec{u}$ is irrotational . A2 : $\vec{u}$ is divergence free and parallel to the boundary. A3 : $\vec{u}$ is divergence free and normal to the boundary. A4 : ∇p is parallel to the boundary.	4.0	1.00
Objective Question				
89	89	In plane poiseuille flow the velocity profile is a A1 : hyperbola A2 : ellipse A3 : parabolas A4 : straight lines	4.0	1.00
Objective Question				
90	90	If p is the pressure, ρ is the density and $\vec{u}$ is the velocity of fluid flows and $\hat{n}$ is the unit normal to the boundary then the momentum flux per unit area is A1 : $\rho\vec{u}$ A2 : $p\hat{n}$ A3 : $\rho\vec{u}\,(\vec{u}.\hat{n})$ A4 : $p\hat{n} + \rho\vec{u}(\vec{u}.\hat{n})$	4.0	1.00
Objective Question				
91	91	If $\vec{u}$ is the velocity of fluid flow and J is the Jacobian of the fluid flow map then $\frac{\partial J}{\partial t}$ is equal to A1 : $J(\nabla.\vec{u})$ A2 : J	4.0	1.00

		A3: $(\nabla.\vec{u})$ A4: $J + (\nabla.\vec{u})$		

Objective Question

92	92	If the Lagrangian is given by $L = \frac{1}{2}m(\dot{r}^2 + r^2\dot{\theta}^2) + \frac{m\mu}{r}$ then the Routhian function is given by A1: $\frac{1}{2}m(\dot{r}^2 + r^2\dot{\theta}^2)$ A2: $\frac{1}{2}m(\dot{r}^2 + \dot{\theta}^2)$ A3: $\frac{1}{2}m(\dot{r}^2 + r^2\dot{\theta}^2) - c\dot{\theta}$ A4: $\frac{1}{2}m(\dot{r}^2 + r^2\dot{\theta}^2) + \frac{m\mu}{r} - c\dot{\theta}$	4.0	1.00

Objective Question

93	93	The flow associated with the vector field $X(x_1, x_2) = (x_1, x_2 - x_2, x_1)$ *is* A1: rotation A2: translation A3: scaling A4: galisean	4.0	1.00

Objective Question

94	94	A fuzzy set A is included in the fuzzy set B is denoted by $A \subseteq B$, if for all x in the universal set satisfies the condition ____________ A1: $\mu_B(x) = \mu_A(x)$ A2: $\mu_B(x) \le \mu_A(x)$ A3: $\mu_A(x) \le \mu_B(x)$ A4: $\mu_A(x) > \mu_B(x)$	4.0	1.00

Objective Question

95	95	The curvature of a circle of radius r is	4.0	1.00

		A1 : $\frac{1}{r^2}$ A2 : $\frac{-1}{r^2}$ A3 : r^2 A4 : $\frac{1}{r}$		
Objective Question				
96	96	$f(z) = \frac{z+1}{z \sin z}$ has A1 : a pole or order 1 at z=0 A2 : a pole of order 2 at z=0 A3 : a pole of order 3 at z=0 A4 : none of these	4.0	1.00
Objective Question				
97	97	Consider the fuzzy relation R= { (x,y), $\mu_R(x,y)$/ $\mu_R(x,y)\in[0,1]$, (x,y) ∈ AxB}, where A&B are two fuzzy sets. The total projection of the fuzzy relation is = ? A1 : $\max_x \min_y \{\mu_R(x,y)/\mu_R(x,y) \in [0,1], (x,y) \in AxB\}$ A2 : $\max_x \max_y \{\mu_R(x,y)/\mu_R(x,y) \in [0,1], (x,y) \in AxB\}$ A3 : $\min_x \max_y \{\mu_R(x,y)/\mu_R(x,y) \in [0,1], (x,y) \in AxB\}$ A4 : $\min_x \min_y \{\mu_R(x,y)/\mu_R(x,y) \in [0,1], (x,y) \in AxB\}$	4.0	1.00
Objective Question				
98	98	Let A be a fuzzy set then the complementary of fuzzy set is A' if A1 : $\mu_{A'}(x) = 1 - \mu_A(x)$ A2 : $\mu_{A'}(x) = \mu_A(x)$ A3 : $\mu_{A'}(x) = 1$ A4 $\mu_{A'}(x) = 0$	4.0	1.00

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Objective Question				
99	99	Let A=[t_1,t_2] and B=[q_1,q_2] be two intervals. The distance between A and B is defined by A1 : $dist(A,B)=\min\{\lvert t_1-q_1\rvert,\lvert t_2-q_2\rvert\}$ A2 : $dist(A,B)=\max\{\lvert t_1-t_2\rvert,\lvert q_1-q_2\rvert\}$ A3 : $dist(A,B)=\max\{\lvert t_1-q_1\rvert,\lvert t_2-q_2\rvert\}$ A4 : $dist(A,B)=\max\{t_1,t_2,q_1,q_2\}$	4.0	1.00
Objective Question				
100	100	Consider the fuzzy set A= $\{(x,\mu_A(x))/\ x\in A,\mu_A(x)\in[0,1]\}$. The height of fuzzy set h(A)=? A1 : *h(A)*=inf *A(x)* A2 : *h(A)= A(x)* A3 : *h(A)*=sup *A(x)* A4 : none of these	4.0	1.00