

University of Mumbai
Examination 2020 under cluster ___ (Lead College Shortname)

Program: Information Technology

Curriculum Scheme: Rev 2016

Examination: Second Year Semester III

Course Code: 301 and Course Name: Applied Mathematics III

Time: 1 hour

Max. Marks: 50

For the students:- All the Questions are compulsory and carry equal marks .

Q1.	$L(e^{-2t} \sin \omega t)$ is
Option A:	$\frac{1}{s^2 + \omega^2}$
Option B:	$\frac{\omega}{(s+2)^2 + \omega^2}$
Option C:	$\frac{s+2}{(s+2)^2 + \omega^2}$
Option D:	$\frac{2}{(s+\omega)^2 + 2^2}$
Q2.	$L^{-1}\left(\frac{1}{s(s-3)}\right)$ is
Option A:	$\frac{1}{3} + \frac{1}{3}e^{3t}$
Option B:	$-\frac{1}{3}e^{3t} + \frac{1}{3}e^{3t}$
Option C:	$\frac{1}{3}(e^{3t} - 1)$
Option D:	$\frac{1}{3}(1 - e^{3t})$
Q3.	The cardinality of the power set of the set {0,1,2} is
Option A:	8
Option B:	6
Option C:	7
Option D:	9
Q4.	$L^{-1}(\log(s^2 + s))$ is
Option A:	$\frac{e^{-t} + 1}{-t}$

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Option B:	$\frac{e^{-t} + 1}{t}$
Option C:	$\frac{e^{-t} - 1}{t}$
Option D:	None
Q5.	$L^{-1}\left(\frac{s-1}{s^2-2s-5}\right)$ is
Option A:	$e^{-t} \cos 2t$
Option B:	$e^{-2t} \sin 2t$
Option C:	$e^t \cos 2t$
Option D:	$e^t \sin 2t$
Q6.	The number of sets $S = \{x/x \text{ is the square of an integer and } x < 10\}$ is
Option A:	$\{0, 2, 4, 5, 9, 58, 49, 56, 99\}$
Option B:	$\{0, 1, 4, 9, 16, 25, 36, 49, 64, 81\}$
Option C:	$\{1, 4, 9, 16, 25, 36, 64, 81, 85, 99\}$
Option D:	None
Q7.	What is the fixed point of $w = \frac{5-4z}{4z-3}$
Option A:	$\frac{5}{4}, -1$
Option B:	$\frac{-5}{4}, 1$
Option C:	$-5, 4$
Option D:	$5, -4$
Q8.	$A - (B \cup C)$ is
Option A:	$A - B) \cup (A - C)$
Option B:	$A - B)(A - C)$
Option C:	$A - B) \cap (A - C)$
Option D:	$(A - B) \cup C)$
Q9.	Find constants a, b if $f(z) = (3x^2y + 2x^2 + ay^3 - 2y^2) + i(bxy - x^3 + 3xy^2)$ is analytic.
Option A:	$a = 1, b = 4$
Option B:	$a = 4, b = 1$
Option C:	$a = -1, b = 4$
Option D:	$a = -1, b = -4$

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Q10.	The number of subsets of set containing n elements is
Option A:	N
Option B:	$2n-1$
Option C:	$2n+1$
Option D:	$2n$
Q11.	Find the analytic function whose real part is $x^2 - y^2 + 3y - 2x + 3$.
Option A:	$f(z) = z^2 - 2z + 3zi$
Option B:	$f(z) = z^2 - 2z - 3zi$
Option C:	$f(z) = z^2 + 3z - 2zi$
Option D:	$f(z) = z^2 - 3z - 3zi + 4$
Q12.	$L(\int_0^t \int_0^t \int_0^t \sin u \, du^3) = \underline{\hspace{2cm}}$
Option A:	$\frac{1}{s^3(s^2 + 1)}$
Option B:	$\frac{s^2}{(s^2 + 1)}$
Option C:	$\frac{s}{(s + 1)^2}$
Option D:	$\frac{1}{s^2(s^2 + 1)}$
Q13.	The symmetric difference of $A = \{1,2,3\}$ and $B = \{3,4,5\}$ is
Option A:	$\{1,2\}$
Option B:	$\{1,2,4,5\}$
Option C:	$\{4,3\}$
Option D:	$\{2,5,1,4,3\}$
Q14.	Find the value of $L^{-1}[\log(s^2 - 7s + 10)]$.
Option A:	$-\frac{1}{t}(e^{5t} - e^{-2t})$
Option B:	$\frac{1}{t}(e^{5t} + e^{2t})$
Option C:	$-\frac{1}{t}(e^{2t} - e^{5t})$
Option D:	$-\frac{1}{t}(e^{5t} + e^{2t})$
Q15.	Let $A = \{1,2,3\}$ and $R = \{2,3\}$ the R in A is
Option A:	Symmetric and transitive
Option B:	Symmetric
Option C:	Transitive
Option D:	Not transitive

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Q16.	Evaluate $L^{-1} \left[\frac{1}{(s-2)^4} \right]$.
Option A:	$e^{2t} \frac{t^3}{3!}$
Option B:	$e^{2t} \frac{t^5}{5!}$
Option C:	$e^{-2t} \frac{t^4}{4!}$
Option D:	$e^{-2t} \frac{t^5}{5!}$
Q17.	The function $f: R \rightarrow R$ defined by $f(x) = 3-4x$ is
Option A:	Onto
Option B:	Not onto
Option C:	Not one to one
Option D:	None
Q18.	If $f(z) = r^3 \cos k\theta + ir^k \sin k\theta$ is analytic then $k = \underline{\hspace{2cm}}$.
Option A:	-4
Option B:	4
Option C:	-3
Option D:	3
Q19.	If $f(x) = \frac{x-1}{x+1}$ then $f(f(x))$ is
Option A:	$1/x$
Option B:	$-1/x$
Option C:	$1/x+1$
Option D:	$1/x-1$
Q20.	$\int_0^\infty e^{-t} \operatorname{erf} 3\sqrt{t} dt = \underline{\hspace{2cm}}$
Option A:	$\frac{3}{\sqrt{10}}$
Option B:	$\frac{1}{\sqrt{5}}$
Option C:	$\frac{9}{\sqrt{10}}$
Option D:	$\frac{2}{\sqrt{5}}$
Q21.	Find the image of interior of circle $ z =1$ under the transformation $W = \frac{1}{z}$
Option A:	interior of circle $ w =1$

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Option B:	Exterior of circle $ w =1$
Option C:	$ w =1$
Option D:	real axis in W- plane
Q22.	$L^{-1}\left(\frac{3s}{(s-2)(s+1)}\right)$ is
Option A:	$2e^{2t} + e^{-t}$
Option B:	$2e^{-t} + e^{2t}$
Option C:	$e^{-t} - 2e^{-t}$
Option D:	$2e^{2t} - e^{-t}$
Q23.	$L^{-1}\left(\frac{1}{(s+2)^6}\right)$ is
Option A:	$e^{-2t} \frac{t^5}{5!}$
Option B:	$e^{-2t} \frac{t^6}{5!}$
Option C:	$e^{2t} \frac{t^5}{5!}$
Option D:	$e^{-2t} \frac{t^6}{6!}$
Q24.	Let $A=\{1,2,3\}$ and $R=\{(1,1), (2,2),(3,3), (1,2)(2,3), (1,3)\}$ then R is
Option A:	Reflexive
Option B:	Symmetric
Option C:	Transitive
Option D:	None
Q25.	If $A= \{1,2,3,4,5\}$ and $R=\{(1,2)(2,1)(3,4) (4,5)(4,3)(5,4)\}$ then R is
Option A:	Symmetric
Option B:	Reflexive
Option C:	Transitive
Option D:	None