

University of Mumbai
Examinations Summer 2022
 Program No : 1T01223

QP-1

Name of the Examination : S.E.(Information Technology Engineering)(SEM-III)(Choice Base Credit
 Grading System)(R2016)
 Subject (Paper Code): 51401 / / Applied Mathematics-III

Time: 2 hour 30 minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Laplace Transform of $e^{3t} \sin t$ is
Option A:	$\frac{1}{(s^2 + 6s + 10)}$
Option B:	$\frac{1}{(s^2 - 6s - 10)}$
Option C:	$\frac{3}{(s^2 - 6s + 10)}$
Option D:	$\frac{1}{(s^2 - 6s + 10)}$
2.	Laplace Transform of $\{\cos 2t \sin 3t\}$ is
Option A:	$\frac{1}{2} \left[\frac{s}{s^2+1} - \frac{s}{s^2+25} \right]$
Option B:	$\frac{1}{2} \left[\frac{1}{s^2+1} + \frac{1}{s^2+25} \right]$
Option C:	$\frac{1}{2} \left[\frac{5}{s^2+25} + \frac{1}{s^2+1} \right]$
Option D:	$\left[\frac{s}{s^2+1} - \frac{s}{s^2+25} \right]$
3.	If $f(z)$ is analytic and equals $u(x,y)+iv(x,y)$ then $f'(z)$ equals
Option A:	$\frac{\partial u}{\partial x} - i \frac{\partial u}{\partial y}$
Option B:	$\frac{\partial u}{\partial x} - i \frac{\partial v}{\partial x}$
Option C:	$\frac{\partial v}{\partial y} - i \frac{\partial v}{\partial x}$
Option D:	$-\frac{\partial u}{\partial x} - i \frac{\partial u}{\partial y}$
4.	Find b if $(bx^3 - 3xy^2 + 3x) + i(3x^2y - y^3 + 3y)$ is analytic.
Option A:	3
Option B:	1
Option C:	-1
Option D:	-3

5.	Inverse Laplace Transform of $\frac{1}{(s-2)^2-1}$ is
Option A:	$e^{-2t} \sinh t$
Option B:	$e^{2t} \sinh t$
Option C:	$e^{2t} \cosh t$
Option D:	$e^{2t} \cos ht$
6.	A relation R on set A is defined as iff $(a, b) \in R \Leftrightarrow (b, a) \in R$, Then Relation is known as
Option A:	Reflexive
Option B:	Transitive
Option C:	Symmetric
Option D:	Equivalence
7.	A function in which one element of Domain Set is connected to one element of Co-Domain Set. Said to be ?
Option A:	Surjective
Option B:	Bijjective
Option C:	Injective
Option D:	Orthogonal
8.	If $A = \{1, 2, 3\}$, Number of power set Of A
Option A:	1
Option B:	3
Option C:	8
Option D:	6
9.	If 8 Persons are chosen from any group, then how many person at least have the same birthday.
Option A:	4
Option B:	2
Option C:	3
Option D:	1
10.	There are 6 balls in a bag . How many ways 2 balls can be drawn ?
Option A:	10
Option B:	4
Option C:	15
Option D:	12

Q2	Solve any Four out of Six	5 marks each
A	Find $L[(t + \sinh t)^2]$	
B	Find $L^{-1}\left[\frac{1}{s(s^2+9)}\right]$	
C	Find the constants a, b, c, d, e if $f(z) = (ax^3 + bxy^2 + 3x^2 + cy^2 + x) + i(dx^2y - 2y^3 + exy + y)$ is analytic.	
D	what is the least number of persons in a group such that names of at	

	least two of them will start with the same English alphabet
E	Let R be the relation on set of real numbers such that aRb if and only if $a-b$ is an integer. Prove that R is an equivalence relation.
F	How many four digit numbers can be formed out of digit 1,2,3,5,7,8,9 if no digit is repeated twice ?

Q3	Solve any Four out of Six	5 marks each
A	Evaluate $\int_0^{\infty} e^{-t} \left(\frac{\cos 3t - \cos t}{t} \right) dt$	
B	Find $L^{-1} \left[\frac{4s+12}{s^2+8s+12} \right]$	
C	Find the analytic function $f(z)$ whose real part is $\frac{1}{2} \log(x^2 + y^2)$	
D	Prove that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$	
E	Let $A = \{1,2,3,4\}$ and $R = \{(1,2), (1,3), (3,3), (3,4)\}$ State the nature of Relation. Give its Matrix.	
F	In how many different ways can 4 ladies and 6 gentlemen be seated in a row, so that no two ladies sit together ?	

Q4	Solve any Four out of Six	5 marks each
A	Evaluate $L \left[\frac{e^{-4t} \sin 3t}{t} \right]$	
B	Find $L^{-1} \left\{ \frac{s}{(s-2)^6} \right\}$	
C	Find the analytic function $f(z)$ in terms of z whose real part is $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$.	
D	If any 5 numbers are chosen from 1 to 8, Show that the sum of two of them will be 9.	
E	If f and g are the functions from the set of integers to the set of integers defined by $f(x) = 2x+3$ and $g(x) = 3x+2$ Find (i) $f \circ g$ (ii) $g \circ f$	
F	Find $L \left\{ \frac{\sin^2 t}{t} \right\}$	