University of Mumbai
Examination 2020
Program: Civil Engineering
Curriculum Scheme: Rev2016
Examination: **Second** Year Semester: **III**
Course Code: 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.	Find the Laplace transform of f(t), f(t)=a, 0< t <b and f(t)=0, t>b
Option A:	$\frac{ab}{s}(1 - e^{-bt})$
Option B:	$\frac{b}{s}(1 - e^{-bt})$
Option C:	$\frac{a}{s}(1 - e^{-bt})$
Option D:	$\frac{-a}{s}(1 - e^{-bt})$
Q2.	Find the Laplace transform of $4t^2+\sin 3t+e^{2t}$
Option A:	$\frac{9}{s^3} + \frac{3}{s^2 + 3^2} + \frac{1}{s - 2}$
Option B:	$\frac{8}{s^3} + \frac{8}{s^2 + 3^2} + \frac{1}{s - 2}$
Option C:	$\frac{8}{s^3} + \frac{3}{s^2 + 3^2} + \frac{4}{s - 2}$
Option D:	$\frac{8}{s^3} + \frac{3}{s^2 + 3^2} + \frac{1}{s - 2}$
Q3.	Find the Laplace transform of $e^{4t}.\sin^3 t$
Option A:	$\frac{6}{(s^2 - 8s + 17)(s^2 - 8s + 25)}$
Option B:	$\frac{64}{(s^2 - 8s + 17)(s^2 - 8s + 25)}$
Option C:	$\frac{6}{(s^2 - 8s + 17)(s^2 - 8s + 20)}$
Option D:	$\frac{6}{(s^2 - 7s + 17)(s^2 - 8s + 25)}$
Q4.	Find the Inverse Laplace transform $\frac{1}{s(s+a)}$
Option A:	$\frac{1 - e^{-at}}{ab}$
Option B:	$\frac{1 - e^{-at}}{a}$
Option C:	$\frac{1 - e^{-t}}{a}$
Option D:	$\frac{1 - e^{at}}{a}$

Q5.	Find $L^{-1}[\frac{1}{S(S^2+4)}]$
Option A:	$\frac{1}{4}(1-cos2t)$
Option B:	$\frac{1}{45}(1-sin2t)$
Option C:	$\frac{1}{4}(1-Cot2t)$
Option D:	$\frac{1}{4}(1-tan2t)$
Q6.	The equations of the two lines of regression are $5x-y=22$ and $64x-45y=24$. Find x and y.
Option A:	$x=6, y=8$
Option B:	$x=3, y=8$
Option C:	$x=4, y=8$
Option D:	$x=6, y=5$
Q7.	Given $N=5, \sum d_i^2 = 8$. Find the rank correlation coefficient R.
Option A:	$R=0.6$
Option B:	$R=0.5$
Option C:	$R=0.4$
Option D:	$R=0.3$
Q8.	Given $\sum d_x d_y = 186, \ \sum d_x = 11, \sum d_y = 7, N=10, \sum d_x^2 = 215, \sum d_y^2 = 163$ Find the correlation coefficient r.
Option A:	0.99
Option B:	0.88
Option C:	0.77
Option D:	0.55
Q9.	Calculate the correlation coefficient for the following data

X	3	5	4	6	2
Y	3	4	5	2	6

Option A:	1
Option B:	-.5
Option C:	.7
Option D:	.9
Q10.	A function satisfy the Laplace equation is known as
Option A:	Analytic function
Option B:	harmonic
Option C:	holomorphic
Option D:	Non holomorphic
Q11.	Find the value of an for xcosx in (- π, π)
Option A:	1/n
Option B:	0

Option C:	2/n
Option D:	4
Q12.	In Fourier integral an is zero when function is
Option A:	Even
Option B:	Odd
Option C:	Real
Option D:	Neither even nor odd
Q13.	If f(x) is odd function then Fourier integral f(x) reduced to
Option A:	Cosine
Option B:	Sine
Option C:	Cosine and sine
Option D:	0
Q14.	What are periodic signals?
Option A:	The signals which change with time
Option B:	The signals which change with frequency
Option C:	The signal that repeats itself in time
Option D:	The signals that repeat itself over a fixed frequency
Q15.	Find the Laplace transform of sin5t
Option A:	$\dfrac{5}{s^2 + 5^2}$
Option B:	$\dfrac{s}{s^2 + 5^2}$
Option C:	$\dfrac{5}{s^2 - 5^2}$
Option D:	$\dfrac{s}{s^2 - 5^2}$
Q16.	Poles of $f(z) = \dfrac{1}{(z-1)(z+2)}$
Option A:	1,-2
Option B:	-1,-2
Option C:	-1,2
Option D:	1,2
Q17.	Poles of $f(z) = \dfrac{z}{(z+3)^2(z+2)}$
Option A:	-3 of order 2 and -2 of order 1
Option B:	-3 of order 2 and -2 of order 2
Option C:	3 of order 2 and -2 of order 1
Option D:	-3 of order 1 and -2 of order 2
Q18.	Find residue at z=1 for $f(z) = \dfrac{z}{(z+2)^2(z-1)}$
Option A:	1/9
Option B:	-1/9
Option C:	2/9

Option D:	-2/9
Q19.	The partial differential equation $xy\frac{\partial z}{\partial x} = \frac{\partial^2 z}{\partial y^2}$
Option A:	Elliptic
Option B:	Hyperbolic
Option C:	Parabolic
Option D:	Not defined
Q20.	The partial differential equation $5\frac{\partial^2 z}{\partial y^2} + 6\frac{\partial^2 z}{\partial y^2} = xy$
Option A:	Elliptic
Option B:	Hyperbolic
Option C:	Parabolic
Option D:	Not defined
Q21.	Hyperbolic condition for partial differential equation
Option A:	$B^2 - 4AC = 0$
Option B:	$B^2 - 4A < 0$
Option C:	$B^2 - 4AC > 0$
Option D:	$B^2 - 4AC \leq 0$
Q22.	Construct an analytic function whose real part is $e^x \cos y$
Option A:	$f(z) = \int e^z . dz = ea^z + c$
Option B:	$f(z) = \int e^z . dz = a^z + c$
Option C:	$f(z) = \int e^z . dz = e^{az} + c$
Option D:	$f(z) = \int e^z . dz = e^z + c$
Q23.	Construct an analytic function whose imaginary part is $e^{-x}(y \cos y - x \sin y)$
Option A:	$z\,e^{-z} + c$
Option B:	$z\,e^z + c$
Option C:	$z\,e^{az} + c$
Option D:	$z\,e^{bz} + c$
Q24.	Construct an analytic function whose imaginary part is $\tan^{-1}\frac{y}{x}$
Option A:	tan z +c
Option B:	sec z +c
Option C:	e^x z +c
Option D:	log z +c
Q25.	Construct an analytic function whose real part is $x^4 - 6x^2y^2 + y^4$
Option A:	$z^4 + c$
Option B:	$ez^4 + c$
Option C:	$e^4 + c$

Option D:	x^4+c