

SAMPLE QUESTION BANK

Program: Information Technology

Curriculum Scheme: Rev 2016

Examination: SE Semester III

Course Code: ITC301 and Course Name: Applied Mathematics III

MCQ Sample Set

1.	$I = \int_0^{\infty} e^{-t} \frac{\sin t}{t} dt$ then value of I is
Option A:	$\pi/2$
Option B:	$\pi/4$
Option C:	$-\pi/4$
Option D:	π
2.	On set of integers , a relation R is defined as aRb iff $a \leq b$ then which of the following is true ?
Option A:	R is equivalence
Option B:	R is symmetric
Option C:	R is not transitive
Option D:	R is reflexive
3.	Inverse Laplace transform of $\frac{1}{s^2-2s+1}$ is
Option A:	e^t
Option B:	te^t
Option C:	$\sin t$
Option D:	te^{-t}
4.	$S = [0,1]$ then S is
Option A:	countable set
Option B:	finite
Option C:	uncountable
Option D:	Both countable as well as uncountable
5.	How many friends you must have to gurantee that at least two of them have birthday in same month
Option A:	8
Option B:	13
Option C:	12
Option D:	10
6.	Analytic function $f(z) = u + iv$ whose imaginary part $v = \tan^{-1} \frac{y}{x}$ is
Option A:	$\tan z$
Option B:	$\log z$
Option C:	$\sin z$
Option D:	$\cos z$

7.	Image of $ z = 1$ under $w = z + 2 + 3i$ is
Option A:	straight line
Option B:	line segment
Option C:	circle
Option D:	ellipse
8.	If repetitions are not permitted , How many 4-digit numbers can be formed using digits 1,2,3,5,7,8
Option A:	360
Option B:	720
Option C:	180
Option D:	1296
9.	From integers 1 to 100 , any one integer is chosen at random. Determine probability that it divisible by 3 or 5.
Option A:	0.47
Option B:	0.53
Option C:	0.59
Option D:	0.48
10.	Three students solve a problem in Mathematics independently. Their chances of solving problem are $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ respectively. Probability that problem is solved is
Option A:	$\frac{1}{4}$
Option B:	$\frac{3}{4}$
Option C:	$\frac{1}{24}$
Option D:	$\frac{13}{12}$
11.	What is the chance that a leap year selected at random will contain 53 Tuesday
Option A:	5/6
Option B:	7/36
Option C:	5/36
Option D:	1/36
12.	After solving the recurrence $a_n = a_{n-1} + 4n$, $n \geq 1, a_0 = 0$, we get
Option A:	$a_n = 3(n + 1), n \geq 0$
Option B:	$a_n = 3n(n + 1), n \geq 0$
Option C:	$a_n = 3(n - 1), n \geq 0$
Option D:	$a_n = 3n(n - 1), n \geq 0$
13.	If $f(x) = x+2$, then $f \circ f \circ f$ is
Option A:	$x+2$
Option B:	$x+6$
Option C:	$3x$
Option D:	$x+4$
14.	Which of the following is not an analytic function

Option A:	\bar{z}
Option B:	z^2
Option C:	$\sin z$
Option D:	$\cos z$
15.	Inverse Laplace transform of $\cot^{-1} s$ is
Option A:	$\frac{1}{t} \sin t$
Option B:	$\frac{1}{t} \cos t$
Option C:	$-\frac{1}{t} \cos t$
Option D:	$-\frac{1}{t} \sin t$
16.	How many numbers must be selected from the set $\{1,2,3,4,5,6\}$ to guarantee that at least one pair of these numbers add up to 7?
Option A:	2
Option B:	3
Option C:	4
Option D:	1
17.	What is the Laplace Transform of $(\cosh t + \sinh t)^n$
Option A:	$\frac{1}{s^2 - n}$
Option B:	$\frac{1}{s + n}$
Option C:	$\frac{1}{s - n}$
Option D:	$S+1$
18.	Inverse Laplace Transform of y'' is
Option A:	$s^2 \bar{y} - y(0) - y'(0)$
Option B:	$s^2 \bar{y} - sy(0) - y'(0)$
Option C:	$s \bar{y} - sy(0) - y'(0)$
Option D:	$s^3 \bar{y} - sy(0) - y'(0)$
19.	The function $y^3 - 3x^2y$
Option A:	Is not harmonic
Option B:	Does not satisfy Laplace equation
Option C:	Is harmonic
Option D:	For this function harmonic conjugate cannot be found.
20.	The function $2x^2 + 5x - 3$ is
Option A:	injective
Option B:	Not injective
Option C:	surjective
Option D:	bijective

Descriptive Sample Set

1	Determine constants a,b,c,d so that $f(z) = (x^2 + axy + by^2) + i(cx^2 + dxy + y^2)$ is analytic
2	$f: \mathbb{R} \rightarrow \mathbb{R} \quad g: \mathbb{R} \rightarrow \mathbb{R} \quad h: \mathbb{R} \rightarrow \mathbb{R} \quad f(x) = x + 4, g(x) = x - 4, h(x) = 4x$ for $x \in \mathbb{R}$ Compute $f \circ g, g \circ f, h \circ h$
3	Find $L\{te^{3t} \sin 3t\}$
4	Find $L^{-1}\left\{\frac{s-2}{(s^2-4s+8)^2}\right\}$
5	In a bolt factory , machines A , B , C manufacture respectively 25% , 35% and 40% of total production. Of this output ,Defective bolts produced by machine A , B , C are 5% , 4% and 3% respectively.A bolt is drawn at random from total production then determine the probability that it is defective.
6	If four points are drawn inside an equilateral triangle of side 1 unit then prove that there are two among them whose distance apart is less than $\frac{1}{2}$ units.

7	There are 6 positive and 8 negative numbers. Four numbers are chosen at random, without replacement, and multiplied. What is the probability that the product is a positive number?
8	Solve the following differential equation using Laplace transform $2y'' + 5y' + 2y = e^{-2t}, y(0) = 1, y'(0) = 0.$
9	If R be a relation in the set of integers Z defined by $R = \{(x, y) : x \in Z, y \in Z, (x - y) \text{ is divisible by } 7\}$. Show that R is an equivalence relation and describe the equivalence classes.
10	Find the orthogonal trajectories of the family of curves $e^x \cos y - xy = c.$
11	Find $L^{-1}\left[\frac{s^2}{(s^2+1)(s^2+9)}\right]$ using convolution theorem.
12	In a factory, machines A, B and C manufacture respectively 25%, 35% and 40% of the total production. If their output 5, 4 and 2 percent are defective objects. An object is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by machine B?

13	Find $L^{-1}\left\{\log\left(\frac{s+a}{s+b}\right)\right\}$
14	Evaluate $\int_0^\infty e^{-t} \frac{\sin^2 t}{t} dt$
15	$f: \mathbb{R} - \left\{\frac{7}{3}\right\} \rightarrow \mathbb{R} - \left\{\frac{4}{3}\right\} \quad f(x) = \frac{4x-5}{3x-7}$ Prove that f is bijective . Hence find f^{-1}
16	Find bilinear transformation which maps points $2, i, -2$ in Z-plane onto points $1, i, -1$ in W-plane.
17	Construct analytic function $f(z) = u + iv$ where $v = e^x(x \sin y + y \cos y)$
18	A student giving true false test answers a question correctly if he knows the

	answer and if he does not know the answer then he answers a question on basis of tossing a coin.If probability that student knows the answer is 1/5 then what is the probability that students knows the answer to a correctly marked question ?
19	Find <i>Inverse Laplace transform by using convolution theorem</i> $\frac{4}{(s^2+4)^2}$
20	<i>Fid the Laplace transform of</i> $te^t \cosh 2t$
21	<i>Show that a relation is reflexive and circular if and only if it is an equivalence relation</i>
22	If $u = k(1 + \cos \theta)$, find v and analytic function $u + iv = f(z)$.
23	Let $A = \{2,3,4,6,8\}$. Let R be defined on A by 'if x divides y then $x R y$ '. Find R and its matrix.
24	Let $A = \{1,2,3,4\}$ and $R = \{(1,1), (1,4), (2,2), (2,3), (4,4)\}$. State the nature of relation give its matrix and digraph.
25	Evaluate $\int_0^{\infty} e^{-t} \sin t \cdot \cos t \, dt$
26	Prove that on the set of integers \geq is a partial order relation also prove that \geq is its dual .
27	Find the analytic functions $f(z) = u + iv$ whose real part is $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$
28	<i>Find the Inverse Laplace transform of</i> $\frac{s+2}{s^2+5s+6}$
29	From the six positive and eight negative numbers, four numbers are chosen at random (without replacement) and multiplied. what is the probability that the product is positive?
30	<i>In the set of natural numbers, prove that the relation $x R y$ if and only if $x^2 - 4xy + 3y^2 = 0$, is reflexive, but neither symmetric nor transitive</i>
31	Find the analytic functions $f(z) = u + iv$ whose imaginary part is $v = \sinh x \cos y$
32	Find the bilinear transform which maps the points $2, i, -2$ onto the points $1, i, -1$ by using cross ratio property
33	<i>Fid the Laplace transform of</i> $te^{-2t} \cos 2t$
34	<i>10 school boys find that they have a total of Rs 101 of them. Show that one or more of them must have at least Rs 11.</i>
35	<i>Prove that</i> $\overline{A \cap B} = \overline{A} \cup \overline{B}$
36	Find <i>Inverse Laplace transform by using convolution theorem</i> $\frac{s}{(s^2+4)^2}$