

SE IT

Applied Mathematics III (CBCGS -H)

Question Bank –Sep. 2020

1. How many friends must you have to guarantee that atleast three of them have birthday on the same day.

- (i) 13
- (ii) 48
- (iii) 35
- (iv) 15

2. Find the last digit of $7^{3^{13}}$.

- (i) 5
- (ii) 7
- (iii) 2
- (iv) 1

3. Find the number R where $5^{48} \equiv R \pmod{24}$

- (i) 3
- (ii) 4
- (iii) 2
- (iv) 1

4. The function $h : \mathbb{Z} \rightarrow \mathbb{Z}$ defined as $f(x) = x^2$ is

- (i) injective only
- (ii) surjective only
- (iii) not surjective
- (iv) cant decide

5. What is $L\{t \sin t\}$

- (i) $2 / ((s^2+1)^2)$
- (ii) $2 / ((s^2+1)^2)$
- (iii) $((s^2+1)^2) / 2s$
- (iv) $s / ((s^2+1)^2)$

6. what is inverse Laplace of $\{e^{(-as)} F(s)\}$.

- (i) $f(t-a) H(t)$

- (ii) $f(t-a) H(t-a)$
- (iii) $f(t) H(t)$
- (iv) $f(t-a) H(t+a)$

7. The mathematics department must choose either a student or a faculty member as a representative for a university committee. How many choices are there for this representative if there are 37 members of the mathematics faculty and 83 mathematics majors and no one is both a faculty member and a student.

- (i) 83
- (ii) 37
- (iii) 129
- (iv) 120

8. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ and $g: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(a) = a-1$ and $g(b) = b^2$. Find composition of g over f at 2, i.e. $f \circ g(2)$.

- (i) 3
- (ii) 4
- (iii) 0
- (iv) 1

9. The relation divides on the set $\{1, 3, 9, 18\}$ is

- (i) partial ordering relation
- (ii) equivalence relation
- (iii) totally ordered relation
- (iv) neither partial or totally ordering

10. Calculate $\gcd(657, 306)$.

- (i) 1358
- (ii) 9
- (iii) 2
- (iv) 8

11. . Evaluate $\int_0^{\infty} e^{-\sqrt{2}t} \frac{\sin t \sinh t}{t} dt$

- (i) $\pi/2$
- (ii) $\pi/4$
- (iii) $\pi/8$
- (iv) $\pi/6$

12. Evaluate $L^{-1} \left[\frac{e^{4-3s}}{(s+4)^{\frac{5}{2}}} \right]$

(i) $\frac{4}{3\sqrt{\pi}} e^{-4(t-4)} (t-3)^{\frac{3}{2}} H(t-3)$

(ii) $e^{-4(t-4)} (t-3)^{\frac{3}{2}} H(t-3)$

(iii) $\frac{4}{3\sqrt{\pi}} e^{-4(t-4)} (t-3)^{\frac{1}{2}} H(t-3)$

(iv) $\frac{4}{3\sqrt{\pi}} (t-3)^{\frac{3}{2}} H(t-3)$

13. For Hasse diagram we remove which of the following:

- (i) edges of reflexivity and transitivity
- (ii) only edges of reflexivity
- (iii) only edges of transitivity
- (iv) neither of them

14. If function $f(z)$ satisfies Laplace equation then it is

- (i) analytic function
- (ii) conjugate function
- (iii) harmonic function
- (iv) can't decide

15. What is the inverse of the function $f : \mathbb{Z} \rightarrow \mathbb{Z}$ defined as $f(x) = 6 - (x/2)$.

- (i) $2-2x$
- (ii) $12-2x$
- (iii) $2-x$
- (iv) $X+2$

16. Relation $\{(a,b)/a+b<6\}$ on the set $\{1,4,5\}$ is

- (i) reflexive
- (ii) symmetric
- (iii) transitive
- (iv) equivalence

17. How many bit strings of length seven are there?

- (i) 64
- (ii) 16
- (iii) 128
- (iv) 8

18. What is image of semi infinite strip $x > 0$, $1 < y < 3$ under the transformation $w = iz + 2$.

- (i) $-1 < u < 1, v > 0$
- (ii) $-1 < v < 1, u > 0$
- (iii) $-2 < u < 2, v > 0$
- (iv) $-1 < u < 2, v > 0$

19. What is inverse Laplace of $1/(s^2 + 9)$?

- (i) $\cos 3t/3$
- (ii) $\sin t/3$
- (iii) $\sin 3t/3$
- (iv) $\sin 3t$

20. Lattice is a PO set with

- (i) maximal element
- (ii) minimal element
- (iii) maximal and minimal elements
- (iv) Neither of them
