# NTPD IMPORTANT QUESTIONS

## UNIT-I

1. Bisection method, Regula falsi method, Newton Raphson method.
2. Newtons forward and Backward, Gauss forward and Back ward, Lagranges methods.
3. Symbolic relations.

## UNIT – II

1. Trapezoidal, Simpsons 1/3 rule and Simpsons 3/8 rule.
2. Taylors, Picards, Eulers, Modified Eulers and R-K methods.

## UNIT- III

- First shifting theorem statement and change of scale property.
- Multiplication with 't' and division by 't' model problems.

1. Solve $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} - 3y = sint, y = \frac{dy}{dx} = 0$ *using Laplace transform*

2. Using convolution theorem, Evaluate $L^{-1}\left\{\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right\}$

3. Find $L^{-1}\left\{log\left(\frac{s+1}{s-1}\right)\right\}$

4. Find the inverse transform of $\frac{s^2-3s+4}{s^3}$

5. Solve $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} - 3y = sint, y = \frac{dy}{dx} = 0$ *using Laplace transform*

6 . Using convolution theorem Find $L^{-1}\left[\frac{1}{(s-2)(s^2+1)}\right]$

# UNIT-IV & V

1 Define Level Of Significance and Degrees of freedom

2. Define Type I & Type II errors

3. The mean and standard deviation of a population are 11795 and 14054 respectively and n=50. Construct 95% confidence interval for the true mean.

4. Define Null Hypothesis And alternative Hypothesis

5. In a sample of 1000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% level of significance

6. The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68 inches respectively. Can the sample be regarded as drawn from the same population of S.D. 2.5 inches.

7. The measurements of the output of two units have given the following results. Assuming that both samples have been obtained from the normal populations at 10% significant level, test whether the two populations have the same variance.

Unit – A : 14.1 10.1 14.7 13.7 14.0

Unit – B : 14.0 14.5 13.7 12.7 14.1

8) (i) A population consists of five numbers 2,3,6,8,and 11.consider all possible samples of size two which can be drawn with replacement from this population. Find a) Mean of the population

b) S.D of population c) The mean of the sampling distribution of the means and S.D of sampling distribution of means.

(ii) Solve the above problem without eplacement.

9. A sample of 64 students have a mean weight of 70 kgs. Can this be regarded as a sample from a population with mean weight 56kgs and S.D. 25kgs.

10. In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers.

What are the applications of the t- distribution.

11. The mean of two large samples of sizes 1000 and 2000 members are 67.5inches and 68 inches respectively. Can the samples be regarded as drawn from the same population of S.D. 2.5 inches.

12.a) A sample of 26 bulbs gives a mean life of 990 hours with a S.D. of 20 hours. The manufacturer claims that the mean life of bulbs is 1000 hours. Is the sample not up to the standard.

b) Among the items produced by a factory out of 500, 15 were defective. In another sample out of 400, 20 were defective. Test the significance between the difference of two proportions at 5% level.

13. In an investigation on the machine performance the following results are obtained.

| | No. of units inspected | No. of defectives |
|---|---|---|
| Machine 1 | 375 | 17 |
| Machine 2 | 450 | 22 |

Test whether there is any significant performance of two machines at $\alpha = 0.05$

14. A firm manufacturing rivets wants to limit variations in their length as much as possible. The length (in cms) of 10 rivets manufactured by a new process are

2.15 1.99 2.05 2.12 2.17

2.01 1.98 2.03 2.25 1.93

15 a) Examine whether the new process can be considered superior to the old if the old population has standard deviation 0.145 cm?

b) Find correction factor for finite population with n=5 and N=200.

16. For an F- distribution find

i). $F_{0:05}$ with $\upsilon_1 = 7$ and $\upsilon_2 = 15$

ii). $F_{0:01}$ with $\upsilon_1 = 24$ and $\upsilon_2 = 19$

iii). $F_{0:95}$ with $\upsilon_1 = 19$ and $\upsilon_2 = 24$

iv). $F_{0:99}$ with $\upsilon_1 = 28$ and $\upsilon_2 = 12$

17. The blood pressure of 5 women before and after intake of a certain drug are given below.

| | | | | | |
|---|---|---|---|---|---|
| Before | 110 | 120 | 125 | 132 | 125 |
| After | 120 | 118 | 125 | 136 | 121 |

Test whether there is significant change in blood pressure at 1% level of significance.

18. Explain chi square test properties and applications.

19. In a sample of 600 students of a certain college 400 are found to be use ball pens. In another college, from samples of 900 students 450 were found to use ball pens. Test whether the 2 colleges are significantly different with respect to the habit of using ball pens.

20. a) If a random variable X is a Poisson distribution such that P (1) =P (2). Find the mean and variance.

b) In a normal distribution 7% of the items are under 35 and 89% are under 63. Determine the mean and variance of the distribution.

21. If the masses of 300 students are normally distributed with mean 68kg and standard deviation kg, how many students have masses

(i) Between 65 and 71 kg inclusive

(ii)Greater than 72 kg

(iii)Less than or equal to 64kg

22. For the continuous probability function $f(x) = kx^2e^{-x}$ when $x \geq 0$

Find (i) k (ii) Mean (iii) Variance

23. A manufacturer of electronic equipment subjects samples of two completing brands of transistors to an accelerated performance test. If 45 of 180 transistors of the first kind and 34 of 120 transistors of the second kind fail the test, what can be conclude at the level of significance $\alpha = 0.05$ about the difference between the corresponding sample proportions?

24. A random variable has the following probability distribution

| x | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| P(x) | a | 3a | 5a | 7a | 9a | 11a |

Determine the value of (i) 'a' (ii) $P(x < 3)$.

25. The mean and variance of a binomial distribution are 4 and 4/3 respectively. Find $P(X \geq 1)$.

**Note: These are only model problems for MID.**