Mark Scored:

KATHMANDU UNIVERSITY
End Semester Examination
August, 2018

Level : B.Arch.
Year : I
Course : MATH 106
Semester: II

Exam Roll No. :
Time: 30 min
F. M. : 20

Registration No.:
Date : AUG 1 2 2018

SECTION "A"
[10Q ×1 = 10 marks]

Fill in the blanks space(s) by most appropriate word(s) or symbol(s).

1. The order that runners cross the finish line is an example of.....scale.

2. How many scales of measurement exist? .....

3. Some hotels ask their guests to rate the hotel's services as excellent, very good, good, and poor. This is an example of the.....scale.

4. Coefficient of variation of a random variable distributed as poisson with parameter λ is.....

5. A graphical representation of groups of data through quartiles is called .....

6. Every polynomial equation of the nth degree has ..... roots.

7. If the parameters of a binomial distribution are n and p, then its mean and variance are ..... & .....

8. If the parameter of a poisson distribution is λ, then its standard deviation is .....

9. .....is a part of the population.

10. The example of a discrete data is .....

SECTION "B"
[10 Q. × 1 = 10 marks]

11. Which one of the following variables is not categorical? .....
    a. Age of a person
    b. Gender of a person: male or female
    c. Choice on a test item: true or false
    d. Marital status of a person (single, married, divorced, other)

12. If f(x) =0 has a root between a & b then f(a) & f(b) are of _____ signs.
    a. opposite b. same c. negative d. positive

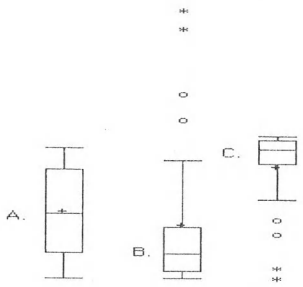
13. The relationship between E and delta is _____.
a. E =1-delta b. E =1+delta c. E = delta-1 d. E = delta

14. Iteration method is a _____ method
a. direct b. indirect c. self correcting d. step by step

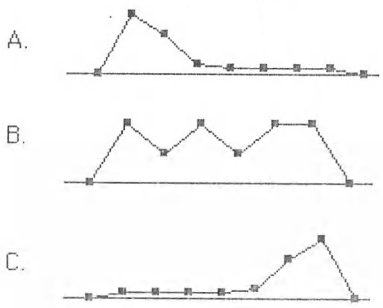
15. The forward difference operator is denoted by the symbol _____.
a. Δ b. ∇ c. ∂ d. ∞

16. The backward difference operator is denoted by the symbol _____.
a. Δ b. ∇ c. ∂ d. ∞

17. Box plots with a large positive skew is .....
a. A b. B c. C d. None of these



18. Frequency polygon with a large negative skew is .....
a. A b. B c. C d. None of these



19. A perfectly normal distribution:.....
a. Is bell shaped, symmetrical and has tails that cross the x-axis at infinity
b. Is only applicable for normal people
c. Has equal mean, median and modes
d. (a) and (c) above

20. If you had a z-score of 2.33 this would tell you that:.....
a. Your score was 2.33 standard deviations above the mean
b. Your score was 2.33 standard deviations below the mean
c. There was a probability of 2.33 of obtaining a score greater than your score
d. There was a probability of 2.33 of obtaining a score less than your score

KATHMANDU UNIVERSITY
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SECTION "C"
[3Q.× 7 = 21 marks]

1. Following are the concentrations of total Esthers (in mg/L) in each of the wines.
284.34 173.01 229.55 312.95 215.34 188.72 144.39 172.79 139.38 197.81
303.28 256.02 658.38 105.14 295.25 170.41 [1+1+2+1+2]
   a. Compute the mean concentration.
   b. Compute the median concentration.
   c. Compute the first quartile of the concentrations.
   d. Compute the third quartile of the concentrations
   e. Construct a box plot for the concentrations. What features does it reveal?

2. Compare root finding process of Newton – Raphson and Iteration Method. Also find the root of the equation $xe^x=1$, using Newton Raphson and Iteration Method. Also compare the results. [2+4+1]

3. The concentration of a reactant is a random variable with probability density function [7]

$$f(x) = 1.2(x + x^2), 0 < x < 1$$

   a. What is the probability that the concentration is greater than 0.5?
   b. Find the mean concentration
   c. Find the cumulative distribution function of the concentration

SECTION "D"
[6Q. × 4 = 24 marks]

4. At a machine center there are four automatic screw machines. An analysis of past inspection of records yields the following data. [2+2]

Machine	Percent Production	Percent Defectives Produced
1	15	4
2	30	3
3	20	5
4	35	3

Machine 2 and 4 are newer and more production has been assigned to them than to machines 1 and 3. Assume that the current inventory mix reflects the production percentages indicated.

   i) If a screw is randomly picked from inventory, what is the probability that it will be defective?
   ii) If a screw is picked and found to be defective, what is the probability that it was produced by machine 3.

5. Scores on a standardized test are approximately normally distributed with a mean of 480 and a standard deviation of 90. [2+2]
   a. What proportion of the scores are above 700?
   b. What proportion of the scores are between 420 and 520?

6. Of all the registered automobiles in a certain state, 10% violate the state emission standard. Twelve automobiles are selected at random to undergo an emission test. [2+2]
   a. Find the probability that exactly three of three violate the standard
   b. Use poisson approximation to binomial distribution for the sum a)

7. A discrete random variable X has probability function px(x) where
   $px(x) = k\left(\frac{1}{2}\right)^x$, x = 1, 2, 3
   = 0, otherwise [1+2+1]
   a. Find k
   b. Find the cumulative distribution function $F_X(x)$
   c. Find the Expectation and Variance

8. Find the absolute error in the sum of the numbers 105.6, 27.28, 5.63, 0.1467, 0.000523, 208.5, 0.0235, 0.432 and 0.0467, where each number is correct to the digits given.

9. Values of x (in degrees) and sin x are given in the following table:

X (in degrees)	Sin x
15	0.2588190
20	0.3420201
25	0.4226183
30	0.5
35	0.5735764
40	0.6427876

Determine the value of $\sin 38^0$

SECTION "E"
[5Q.× 2 = 10 marks]

10. Evaluate $\Delta^2 x^3$

11. If $p = 3c^6 - 6c^2$ find the percentage error in p at c=1, if the error in c is 0.05

12. Find a real root of $f(x) = x^3 + x^2 + x + 7$ correct to three decimal places using bisection method. Test till four iteration.

13. Find a real root of $f(x) = x^3 + x^2 + x + 7$ correct to three decimal places using Regula Falsi. Test till four iteration.

14. A continuous random variable X has the PDF f(x) = 2x if $0 \leq x \leq 1$. Find the cumulative distribution function (CDF) for X.