140522

VCD -FYIT NUMERICAL STATISTICAL METHODS SEM -II MAY -2022 TIME 3 HRS MARKS -75

*All questions are compulsary

*Right indicates full marks

Q.1 ) Attempt the following (40)

1) In floating point representation the number that expressed as a fractional part called ----------

a) Significant b) Exponent c) approximate d) Mantissa

2) Accuracy and precision are used n context of ----------

a) Experiment b) Measurement c) Acurate value d) Approximate value

3) Relative error is the ratio between ---------

a) Approximate error & Percentage error b) Percentage error and Approximate error
c) Present approximation & Previous approximation d) True error & percentage error

4) Approximate error is the difference between the

a) Present approximation & Previous approximation b) Previous approximation & previous error
c) Relative approximate error & Present approximation d) Present approximation & relative approximate error

5) Bisection method is also called as –

a) Bineary search method b) Bracketing method c) Iterative method d) All the above

6) Evaluate first iterative value by using Regula falsi method if $f(x) = x^3 - x - 4$ *in interval* $[1, 2]$

a) 1.5557 b) 1.6667 c) 1.9997 d) 1.3337

7) Evaluate f($x_2$ ) for first iteration by secant method if $f(x) = x^4 - x - 10$ *with interval* $[1, 2]$

a) -3.0795 b) -3.0079 c) -0.3079 d) -2.0659

8) Find y at x=1.5 if f(x) =$\frac{1}{6}(-x^3 - 3x^2 + 16x - 6)$

a) 2.3115 b) 1.3125 c) 1.3115 d) 1.2535

9) If P =-0.5 , x = 7.5 and $x_0 = 8$ evaluate h =? In Newton interpolation formula

a) 1 b) 2 c) 3 d) 4

10) Evaluate X ,Y , Z if system of equations are X+Y+Z =90 , 2X+3Y+6Z =370 ,3X-8Y-4Z =-340

a) X=-10 ,Y =30 , Z= 40 b) X=10 ,Y =30 , Z= 40 c) X=20 ,Y =30 , Z= 40 d) ) X=20 ,Y =20 , Z= 50

11) When n=2 then the method is called ----------

a) Trapazoidal Rule b) Simpson's 1/3rd rule c) Simpson's 3/8th rule d) Taylor method

12) If f(x) =$\int_1^4 4x + 2\,dx$ *with* $n = 6$ *what is h?* by Trapazoidal rule

a) 0.2 b) 0.3 c) 0.5 d) 0.6

13) If $\frac{dy}{dx} = 1 + xy$ *evaluate third order derivative*

a) $y'' + 2y'$ b) $xy'' + 2y'$ c) $y'' - 2y'$ d) $xy'' - 2y'$

14) Area of the right of the ordinate is equal to area of the left of ordinate in normal distribution is

a) - 0.2 b) 0.2 c) 0.5 d) -0.5

15) Mean of the distribution in continuous uniform distribution is ------

a) b+a b) a+2b c) (b+a)/2 d) (b-a) /2

16) If X ~ U(3,12) find mean and variance of continuous uniform distribution

a) 7.5 and 6.75 b) 6.5 and 6.45 c) 5.5 and 5.35 d) 7.5 and 5.35

17) Let X be a poisson random variable with P(x=0) =0.2 Find Variance

a) 1.5063 b) 1.6094 c) 1.4057 d) 1.3294

18) If $b_{xy} = 0.45$ $b_{yx} = 0.8$ evaluate r= ?

a) 0.6 b) 0.5 c) 0.1 d)0.8

19) Any solution of L.P.P. which satisfies the non negativity restrictions of the problem is called ---

a) Objective function b) Feasible solution c) Optimal solution d) Solution

20) The optimal value of the objective function is attained at the points

a) Given by intersection of lines representing inequation with axes only

b) Given by intersection of lines representing inequation with X-axis only

c) Given by corner points of the feasible region d) At the origin

**Q.2) A) Attempt the following (solve any one )** **(04)**

1) Define –i) Relative error ii) Percentage error iii) Blunder Iv) Truncation error

v) Approximate error

2) The derivative of a function f(x) at a particular value of x can be approximately calculated by $f'(x) = \frac{f(x+h)-f(x)}{h}$ *for* $f(x) = 7e^{0.5x}$ *and* $h = 0.3$ *find relative true error at* $X = 2$

**B) Attempt the following (Solve any one)** **(03)**

1) Explain the following - i) Overflow ii) Underflow

iii) perform the operation – i) 0.9998E1+0.1000E-99 ii) 0.1000E5 +0.999E3

2) Write a short note on Conservation law of engineering

**Q.3 A) Attempt the following (Solve any one )** **( 04)**

1) Solve by using Secant method upto three iteration only if $f(x) = x^2 - logx - 12 = 0$

2) By using Newton -Rapshon method calculate $\sqrt{10}$ upto four decimal places (Three iteration only)

with initial value $x_0 = 3$

**B) Attempt the following (Solve any one )** **(03)**

1) Given

| x | 1 | 2 | 3 |
|---|---|---|---|
| y | 7 | 18 | 35 |

Using Lagrange's interpolation formula find f (2.5)

2) Find the missing term in the table

| x | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| y | 9 | 12 | 15 | - | 45 |

**Q.4 ) A) Attempt the following (solve any one )** **(04)**

1) Use Gauss Jordan method to solve the following equation

$2x + 3y - 4z = 1, 5x + 9y + 3z = 17, -8x - 2y + z = -9$

2) Find the integration $\int_1^4 (4x - 1)\,.dx$ using Simpson's 3/8 th rule using six strips .

**B) Attempt the following (Solve any one )** **(03)**

1) Using Taylor's series method , for the equation $\frac{dy}{dx} = 3x + y^2$ and y(1) =0

to find the value of y at x= 0.2 where h = 0.1 ( upto third order)

2) Apply Runge -Kutta second order method to find approximate value of y when x = 0.2 given that $\frac{dy}{dx} = x + y$ , y(0) =1 with h =0.1

**Q.5 ) A) Attempt the following (solve any one )** **(04)**

1) Solve graphically the following linear programming problem

Max Z = 9x + 13y

Subject to 2x+3y ≤ 18

2x +y ≤ 10

X≥ 0 $y \geq 0$

2) Fit the equation of straight line with the help of given data

| X | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Y | 0.1 | 0.3 | 0.5 | 0.7 | 0.9 |

**B) Attempt the following (Solve any one )** **(03)**

1) Two spare parts X and Y are to be produced in a batch .Each me has to go through two processs A and B The time required in hours per unit and total time available are given below also plot a graph of given L.P.P

| | X | Y | Total hrs |
|---|---|---|---|
| Process A | 3 | 4 | 24 |
| Process B | 9 | 4 | 36 |

Profits per unit of X and Y are Rs 5 and Rs 6 .Find how many numbers of spare parts of X and Y are to be produced in this batch to maximize the profit

2) Find the regression equation Y on X and regression equation X on Y with the help of given data

$\bar{x}$ =65 ,$\bar{y}$ = 67 $\sigma_x = 2.5$ , $\sigma_y = 3.5$ and r=0.8.

**Q.6) ) A) Attempt the following (solve any one )** **(04 )**

1) The diameter of electric bulb say X is assumed to be continuous random variable with

$f(x) = 6x\,(1-x), 0 \le x \le 1$ *determinea number* $b$ *such that* $p(X < b) = p(X > b)$

Also check given function is probability density function .

2) For a random variable X the following data is available ,Evaluate probability mass function , Expected value and variance with the help of given data

| $x_i$ | 5 | 10 | 15 | 20 | 25 |
|---|---|---|---|---|---|
| $f_i$ | 10 | 5 | 20 | 10 | 5 |

**B) Attempt the following (Solve any one )** **(03)**

1) Define Binomial distribution , Find binomial distribution if mean =48 and standard deviation is 4

2) For a binomial variate X , mean is 3 and variance is 2 Find mode of distribution and odds in favour of X =0

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