19DAU03

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2019
(First Semester)

Branch - COMPUTER SCIENCE WITH DATA ANALYTICS

MATHEMATICAL FOUNDATION FOR DATA SCIENCE

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer ALL questions
ALL questions carry EQUAL marks (10 x 1 = 10)

If $f(x)=x^3-x$, f*(x)=
(i) 3x (HjTx^l (iii) $3x^2-l$ (iv) 3

The local minimum value of $f(x)=x^2$ is
(i) 1 (ii) 0 (iii) -1 (iv) 0.1

$\sum_{i=1}^{n} I_i^2 =$
(i) $n(n+1)$ (ii) $n(n+1)$ (iii) $n(n-l)(2n)$ (iv) $n(n+l)(2n+l)$
6

4 $f(x)=x^3$ has at x=0.
(i) maximum (ii) minimum
(iii) no maximum or minimum (iv) maximum or minimum

As soon as a new value for a variable is found by iteration it is used immediately in the following equation - this method is called
(i) Gauss-Seidal (ii) Jacobi's (iii) Gauss-Jordan (iv) Relaxation

6 Large system of linear equations are solved by_____method.
(i) Cramer (ii) direct (iii) elimination (iv) substitution

7 Find the n^{L} difference of e^{v}.

(i) $\left|\left(\frac{h}{e-1}\right)^{J}\right| e^{nx}$ (ii) $\left|\left(\frac{h}{1-e^{h}}\right)^{l}\right| e^{nx}$ (iii) $\left|\left(\frac{1}{1-e^{h}}\right)^{y}\right| e^{\sim nx}$ (iv) $\left|\left(\frac{h}{e-1}\right)^{/}\right|^{>1}$

8 The process of finding the values ____ of an given interval is called extrapolation.
(i) inside (ii) outside (iii) at one point (iv) at some point

9 1+A=

(i) e ^ (ii) e ^ (iii) e^{hD} (iv) e^{hD}

10 Simpson's one third rule is also called_____ rule.
(i) parabolic (ii) elliptic (iii) hyperbolic (iv) canonical

SECTION r B (25 Marks!
Answer ALL questions
ALL questions carry EQUAL Marks (5 x 5 = 25)

11 a If $f(x)=x^3-x$, find and interpret f'' (x).

OR

b Find the g'(x) of g(x) = Vl + 2x using the definition of derivative, state the domain of g(x) & g'(x).

12 a (i) Setup an expression for $\int_{1}^{3} e^{x} dx$ as a limit of sums.

(ii) Use a computer algebra system to evaluate the above expression.

12 Cont...

b Find (i) $\frac{dx}{dx}\int_{3}^{4}\sec(t)dt$ (ii) $\int_{3}^{6}\frac{V}{x}$

13 a Solve 5x-y-2z=142, x-3y-z=-30 and 2x-y-3z=5 by Gauss elimination method.

OR

b Solve $5x_1+x2+x_3+x_4=4$, $X_I+7x_2+x_3+x_4=12$, $x_1+x_2+6x_3+x_4=-5$, $x_1+x_2+x_3+4x_4=-6$ by Gauss-Jordan method.

14 a In the table below, estimate the missing value:

x:	0	1	2	3	4
y:	1	2	4		16

Explain why it differs from 2 -8.

OR

b Find $A \tan^{1}\left(\frac{n-0}{\quad}\cdot\right)$ in terms or $\tan^{-1}$.

15 a Find y when x=32 from the following data using Newton-forward formula.

x:	10	15	20	25	30	35
y:	35.3	32.4	29.2	26.1	23.2	20.5

OR

b Find $\frac{dy}{dx}$ atx=1.25 from the following table:

x:	1	1.05	1.10	1.15	1.20	1.25	1.30
y:	1	1.0&47	1.04881	1.07238	1.09544	1.11803	1.14017

SECTION -C (40 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 8 = 40)

16 a Where is the function f(x)=|x| differentiable?

OR

b A cylindrical can is to be made to hold 1 L of oil. Find the dimensions that will minimize the cost of the metal to manufacture the can.

17 a Find the area of the region enclosed by the parabolas $y=x^2$ and $y=2x-x^2$.

OR

b Find the volume of the solid obtained by rotating about the x-axis the region under the curve y=Vx from 0 to 1. Illustrate the definition of volume by sketching a typical approximately cylinder.

18 a Solve x+17y-2z=48, 30x-2y+3z=75, 2x+2y+18z=30 using Gauss-Jacobi iteration method (correct to 3 decimal places).

OR

b Solve 13x+5y-3z+u=18, 2x+12y+z-4u=13, 3x-4y+10z+u=29, 2x+y-3z+9u=31 by Gauss-Seidal method, proceeding upto 6 iterations.

19 a If

p:	40	50	60	70	80	90
t:	184	204	226	250	276	304

find t when p=84. (Using Newton's interpolation formula).

OR

b Given u_0=-4, **Ui=-2,** u_4=220, u_5=546, u_6=l 148. Find u_2 and u_3.

20 a Using Bessel's formula, find f'(x) at x=0.04 from the following table:

x:	0.01	0.02	0.03	0.04	0.05	0.06
f(x):	0.1023	0.1047	0.1071	0.1096	0.1122	0.1148

OR

b Using the following data, find f*(5).