16/11/19 VCD CLASS-FYIT SUB-NSM ATKT OCTOBER-2019 MARKS-75 TIME-$2^{1/2}$ HR

*Right indicates full marks

*All questions are compulsary

Q.1) Solve any three of the following (15)

a)Write note on conservation laws and engineering problems.

b)Define accuracy and precision.What are round off errors?Explain.

c)What is a mathematical model?With the help of a flowchart,explain the solving of an engineering problem.

d)Round-off 0.987250 correct to four significant figures and find out absolute,relative and percentage error.

e)Find the truncation error and exponential series given as, $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots + \frac{x^n}{n!}$ for computation of first six terms in expansion at x=2.5

f)Define error and its types with suitable example.

Q.2)Solve any three from the following (15)

a) Find the root of the equation x^3 -x-11=0 using Bisection method in four stages.

b) Using Newton Rapshon method find the root of the equation if f(x)= 3sinx-2x+5.

c)Use secant method to find the rooy of the equation $cosx - xe^x = 0$.

d)Prove that $\Delta\nabla = \Delta - \nabla$.

e)Using Newton Forward difference interpolation formula find f(8)from the following data

x	5	10	15	20
f(x)	50	70	100	145

f)Use Langranges interpolation formula find the values of y and when x=8 from the following table:

x	5	6	9
y	12	13	14

Q.3)Solve any three of the following (15)

a)Use Guass Jordon method to solve thefollowing equation

$2x_1+3x_2-4x_3=1$; $5x_1+9x_2+3x_3=17$; $-8x_1-2x_2+x_3=-9$

b)Find the solution of the following system using Guass Seidel method

3x-2y=5 ; -x+2y-z=0 ; -2y+z=-1

c)Solve $\frac{dy}{dx} = x^2y - 1, y(0) = 1$ by Taylor's series method and calculate y(0.1) and y(0.2).

d)Solve following differential equation by Euler's method. $\frac{dy}{dx} = x - y^2$.Where y(0)=1 and h=0.2 and n=5.

e)Given $\frac{dy}{dx} = 1 + y^2$ where y=0 when x=0.Find y(0.2),y(0.4) and y(0.6) using Runge-Kutta's fourth order formula.

f)Evaluate $\int_4^{5.2} logx\, dx$ by Simpsons's $\frac{1}{3^{rd}}$ rule.

Q.4)Solve any three of the following (15)

a)Fit a second degree of parabola of the following data

X	1	2	3	4	5	6
y	3	7	10	12	14	17

b)Using method of least square fit a equation of line

X	0	1	2	3	4	5	6
y	1	4	10	17	30	38	50

c)Obtain a regression plane by using multiple linear regression to fit the following data

X	0	1	2	3	4	5
Z	1	2	3	4	5	6
Y	13	17	19	21	26	30

d)Two tailors A and B earn Rs.15 and Rs.20 per day respectively.A can stitch 6 shirts and 4 pants while B can stitch 10 shirts and 4 pants per day.How many days shall each work if it is desired to product (at least) 60 shirts and 32 pants at a minimum labour cost?

e)Draw graph with help of the following data

Maximise: $z=3x_1+8x_2$

Subject to: $3x_1 + 4x_2 \leq 18$

$4x_1 + 5x_2 \leq 21$

$x_1 \geq 0, x_2 \geq 0$

f)Find the regression coefficient and regressiuon line X on Y and Y on X with the help of following data

X	Y
70	62
48	47
58	53
55	60
54	55
50	68
60	51
52	48

Q.5)Solve any three of the following (15)

a)A random variable X follow a binomial distribution with mean=2 and variance=1.2.Find

i)P(x=1) ii)P(X≥1) iii)P(X<1).

b)A random variable X follow a exponential distribution with mean =5.Find

i)Median ii)Variance of distribution iii)P(X≥2).

c)Consider the probability distribution of a following random variable X.

$P(X = x) = {}^7C_x(\frac{3}{4})^x(\frac{1}{4})^{7x}$,x=0,1,2,....,7=0 otherwise find:

i)P(X≤2) ii)P(X>3) iii)P(X≥3)

d) Following is the c.d.f F(x) of discrete r.v.x.

x	1	2	3	4	5	6
F(X=x)	0.2	0.37	0.48	0.62	0.85	1

i)Find p.m.f of X. ii)$P(2< X < 5)$ iii)$P(X \leq 5/X > 3)$

e) The number of complaints which a bank manager receives per day is a poison random variable with parameter m=4.Find the probability that the manager will receive.

i)Only two complaints on any given day.

ii)At most two complaints on any given day(use e^{-4}=0.0183)

f)The p.d.f. of continuous random variable X is given by $f(x)=\frac{x+4}{18}, -2 < x < 4 = 0$ otherwise.Find

i)$P(X < 1)$ ii)$P(-1 < X < 1)$