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REDUCED Numerical Methods

12th Standard

Business Maths

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52 x 1 = 52

1) $\Delta^2 y_0$ =
(a) $y_2 - 2y_1 + y_0$ (b) $y_2 + 2y_1 - y_0$ (c) $y_2 + 2y_1 + y_0$ (d) $y_2 + y_1 + 2y_0$

2) $\Delta f(x)$ =
(a) f(x+ h) (b) f(x) − f(x+h) (c) f(x + h) − f(x) (d) f (x) − f(x−h)

3) E ≡
(a) 1 + Δ (b) 1 - Δ (c) 1 + ∇ (d) 1 - ∇

4) If h = 1, then $\Delta(x^2)$ =
(a) 2x (b) 2x −1 (c) 2x +1 (d) 1

5) If c is a constant then Δc =
(a) c (b) Δ (c) Δ^2 (d) 0

6) If m and n are positive integers then $\Delta^m \Delta^n f(x)$ =
(a) $\Delta^{m+n} f(x)$ (b) $\Delta^m f(x)$ (c) $\Delta^n f(x)$ (d) $\Delta^{m-n} f(x)$

7) If 'n' is a positive integer $\Delta^n[\Delta^{-n} f(x)]$
(a) f(2x) (b) f(x+ h) (c) f (x) (d) Δf(x)

8) E f (x)=
(a) f(x− h) (b) f (x) (c) f(x+ h) (d) f(x+ 2h)

9) ∇ ≡
(a) 1+E (b) 1 - E (c) $1 - E^{-1}$ (d) $1 + E^{-1}$

10) ∇ f(a) =
(a) f (a) + f(a−h) (b) f (a) − f(a + h) (c) f (a) − f(a − h) (d) f (a)

11) For the given points (x_0, y_0) and (x_1, y_1) the Lagrange's formula is
(a) $y(x) = \frac{x-x_1}{x_0-x_1} y_0 + \frac{x-x_0}{x_1-x_0} y_1$ (b) $y(x) = \frac{x_1-x}{x_0-x_1} y_0 + \frac{x-x_0}{x_1-x_0} y_1$ (c) $y(x) = \frac{x-x_1}{x_0-x_1} y_1 + \frac{x-x_0}{x_1-x_0} y_0$ (d) $y(x) = \frac{x_1-x}{x_0-x_1} y_1 + \frac{x-x_0}{x_1-x_0} y_0$

12) Lagrange's interpolation formula can be used for
(a) equal intervals only (b) unequal intervals only (c) both equal and unequal intervals (d) none of these.

13) If f $(x)=x^2 + 2x + 2$ and the interval of differencing is unity then Δf (x)
(a) 2x −3 (b) 2x +3 (c) x + 3 (d) x − 3

14) For the given data find the value of $\Delta^3 y_0$ is

x	5	6	9	11
y	12	13	15	18

(a) 1 (b) 0 (c) 2 (d) -1

15) E^2.f(x) =
(a) f(x + h) (b) f(x + 2h) (c) f(2h) (d) f(2x)

16) ∇f(x+ 3h)
(a) f{x + 2h) (b) f(x + 3h) - f(x + 2h) (c) f(x + 3h) (d) f(x + 2h) - f(x - 3h)

17) Δf(x + 3h)
(a) f(x + 3h) - f(x + 4h) (b) f(x + 4h) - f(x + 3h) (c) f(x + h) - f(x) (d) f(x + 2h) - f(x + 3h)

18) Δ can be defined as Δf(x) =f(x + h) -f(x) where h is the __________ interval of spacing
(a) equal (b) unequal (c) equal & unequal (d) equal or unequal

19) If c is a constant, then Δc =
(a) c.Δ (b) c.∇ (c) 0 (d) 1

20) Δ(f(x) + g(x)) = ________
(a) Δf(x) + Δg(x) (b) f(x) ± Δg(x) (c) f(x) Δ g(x) (d) g(x). Δf(x)

21) If c is a constant, then Δc.f(x)
(a) 0 (b) c.f(Δx) (c) c.Δf(x) (d) f(Δcx)

22) Δ[f{x) . g(x)] = __________
(a) Δf(x). Δg(x) (b) f(x) . Δg(x) + g(x) .Δf(x) (c) f(x) . Δg(x) (d) f(Δx) . g(Δx)

23) Let y = f(x) be a given function of x and y_0, $_y1$., yn be the values of y at x = x_0, x_1, x_2 ... respectively, then ∇y_1 is
(a) $y_1 - y_2$ (b) $y_0 - y_2$ (c) $y_0 - y_1$ (d) $y_1 - y_0$

24) E $[f(x_0)]$ is
(a) $f(x_o + h)$ (b) $f(x_o - h)$ (c) $f(x_o) + h$ (d) $f(x_o) - h$

25) $E^{-n}f(x)$ is
(a) F(x + nh) (b) F(x - nh) (c) F(-nh) (d) f(x - n)
26) E [c.f(x)] = ___________ where c is a constant
(a) E (f(c) (b) c. Ef(x) (c) $E\left(\frac{f}{c}\right)$ (d) E(-fc)
27) (1 + Δ) (1 - ∇) is
(a) 0 (b) 1 (c) -1 (d) (1 - ∇ . Δ)
28) The value of Δe^x is
(a) $e^{ax}(e^h - 1)$ (b) $e^x(1- e^h)$ (c) $e^x(e^h - 1)$ (d) $e^{ax}(1 - h)$
29) The two methods of interpolation are
(a) Forward & backward interpolation (b) graphical method & forward interpolation (c) graphical method & backward interpolation (d) graphical method & algebraic method
30) Newton's forward interpolation formula is used when the value of y is required near the ______ of the, table
(a) end (b) beginning (c) left (d) right
31) Newton's backward interpolation formula is used when the value of y is required at the __________ of the table.
(a) beginning (b) end (c) left (d) right
32) If the values of x are not at equi-distant then we can use
(a) Newton's forward interpolation (b) Newton's backward interpolation (c) Lagrange's formula (d) graphical method.
33) For the given set of values; the value of $\Delta^4 y$ is

x	1	2	3	4	5
y	1	8	27	64	125

(a) 7 (b) 12 (c) 6 (d) 0
34) For the given set of values, the value of $\nabla^2 y$ is

x	75	80	85	90
y	2459	2018	1180	402

(a) 402 (b) -778 (c) 60 (d) 457
35) The nationality of the mathemalician Joseph Louis Lagrange is _________
(a) German (b) Spain (c) Italian (d) French
36) The knowledge of ______ is essential for the study of Numerical Analysis
(a) Differences (b) finite differences (c) interpolation (d) extrapolation
37) The forward difference operator Δ is
(a) Nepla (b) Alpha (c) Gamma (d) Delta
38) The backward difference operator ∇ is
(a) Nepla (b) Alpha (c) Gamma (d) Delta
39) Δ is _____________
(a) Commutative (b) distributive (c) closure (d) associative
40) The differences of the first differences are ________________
(a) $\Delta^2 y_0, \Delta^2 y_1,\dots,\Delta^2 y_n$ (b) $\Delta y_0, \Delta y_1,\dots, \Delta y_n$ (c) $\Delta^2 y_0$ (d) Δy_0
41) $\Delta^k f(x)$ = __________
(a) $\Delta^k f(x + h) - \Delta^{k+1} f(x)$ (b) $\Delta^{k+1} f(x+h) - \Delta^{k-1} . f(x)$ (c) $\Delta^{k+1} f(x+h) - \Delta^k f(x)$ (d) $\Delta^{k+1} f(x+h) - \Delta^{k-1} .f(x+h)$
42) $\Delta\left[\frac{f(x)}{g(x)}\right]$ = _______
(a) g(x) . Δf(x) - f(x) Δg(x) (b) $\frac{f^{-1}(x)g(x)-f(x)g(x)}{g^2 f(x)}$ (c) $\frac{g(x).\Delta f(x)-f(x).\Delta g(x)}{g(x).g(x+h)}$ (d) f(x) . Δg(x) - g(x) . Δf(x)
43) ∇ = _______________
(a) ∇ . Δ (b) $E^{-1}\Delta$ (c) E . Δ (d) $E^2\Delta$
44) ∇ . Δ = _______
(a) Δ + ∇ (b) $\frac{\Delta}{\nabla}$ (c) $\frac{\nabla}{\Delta}$ (d) Δ - ∇
45) Δ (1 / x) where h = 1 is ___________
(a) $\frac{-1}{x(x+1)}$ (b) $\frac{1}{x(x+1)}$ (c) $\frac{2}{(x)(x+1)}$ (d) $\frac{2}{x(x+1)(x+2)}$
46) If Y is to be estimated for the values of x when lies outside the given set of the values of it is called _____________
(a) Interpolation (b) extrapolation (c) forward interpolation (d) backward interpolation
47) If y is to be estimated for the values of x which lies unside the given set of the values of it is called __________
(a) (b) (c) Forward (d) backward

(a) Interpolation	(b) extrapolation	(c) Interpolation	(d) Interpolation

48) If y is to be estimated for the value of x between two extreme points in a set of values, it is called ___________

(a) Interpolation (b) extrapolation (c) Forward interpolation (d) backward interpolation

49) In Newtons forward and backward interpolation formula, the first two terms will give the __________ interpolation

(a) linear (b) parabolic (c) quadratic (d) cubic

50) For the set of values

x	1961	1971	1981	1991	2001
y	46	66	81	93	101

A	B
1) Δy	(a) -5
2) $\Delta^2 y$	(b) 2
3) $\Delta^3 y$	(c) -3
4) $\Delta^4 y$	(d) 20

(a) 1 - a, 2 - b, 3 - c, 4 - d (b) 1 - b, 2 - c, 3 - d, 4 - a (c) 1 - d, 2 - a, 3 - b, 4 - c (d) 1 - c, 2 - a, 3 - b, 4 - c

51) For the set of values,

x	1	2	3	4	5
y	8	12	19	29	42

A	B
1) $\nabla^2 y$	a) 16
2) ∇y	b) 3
3) y	c) 1
4) x_0	d) 8

The correct match is

(a) 1 - a, 2 - b, 3 - c, 4 - d (b) 1 - b, 2 - a, 3 - d, 4 - c (c) 1 - b, 2 - c, 3 - d, 4 - a (d) 1 - c, 2 - b, 3 - d, 4 - a

52) Let y = f(x) be a given function of x. Let y_o, y_1 ... yn be the values of y at x = x_o, x_1 ... x_n respectively. Then

A	B
1) ∇y_2	a) $y_n - y_{n-1}$
2) ∇y_1	b) $y_2 - y_1$
3) ∇y_n	c) $y_1 - y_0$
4) $\nabla^2 y_n$	d) $\nabla y_n - \nabla y_{n+1}$

The correct match is

(a) 1 - a, 2 - b, 3 - c, 4 - d (b) 1 - b, 2 - c, 3 - d, 4 - a (c) 1 - c, 2 - d, 3 - a, 4 - b (d) 1 - b, 2 - c, 3 - a, 4 - d

11 x 2 = 22

53) Find (i) Δe^{ax}

(ii) $\Delta^2 e^x$

(iii) $\Delta \log x$

54) Evaluate $\Delta^2\left(\frac{1}{x}\right)$ by taking '1' as the interval of differencing.

55) If f (x) = e^{ax} then show that f(0), Δ(0), Δ^2 are in G.P

56) Prove that

$(1 + \Delta)(1 - \nabla) = 1$

57) Prove that

$\nabla\Delta = \Delta - \nabla$

58) Prove that

$E\nabla = \Delta = \nabla E$

59) Find the missing term from the following data.

x	20	30	40
y	51	-	34

60) If f(0) = 5, f(1) = 6, f(3) = 50, find f(2) by using Lagrange's formula.

61) Find the missing term from the following data

x	1	2	3	4
f(x)	100	-	126	157

62) When h = 1, find $\Delta(x^3)$.

63) Find the second order backward differences of f(x).

23 x 3 = 69

64) Using graphic method, find the value of y when x = 38 from the following data:

x	10	20	30	40	50	60
y	63	55	44	34	29	22

65) Construct a forward difference table for the following data

x	0	10	20	30
y	0	0.174	0.347	0.518

66) Construct a forward difference table for $y = f(x) = x^3+2x+1$ for x = 1,2,3,4,5

67) By constructing a difference table and using the second order differences as constant, find the sixth term of the series 8,12,19,29,42…

68) Prove that $f(4) = f(3) + \Delta f(2) + \Delta^2 f(1) + \Delta^3 f(1)$ taking '1' as the interval of differencing.

69) Given $U_0 = 1$, $U_1 = 11$, $U_2 = 21$, $U_3 = 28$ and $U_4 = 29$ find $\Delta^2 U_0$

70) Given $y_3 = 2$, $y_4 = -6$, $y_5 = 8$, $y_6 = 9$ and $y_7 = 17$ Calculate $\Delta^4 y_3$

71) From the following table find the missing value

x	2	3	4	5	6
f(x)	45.0	49.2	54.1	-	67.4

72) Evaluate $\Delta(\log ax)$.

73) If $y = x^3 - x^2 + x - 1$ calculate the values of y for x = 0,1,2,3,4,5 and form the forward differences table.

74) If h = 1 then prove that $(E^{-1}\Delta)x^3 = 3x^2 - 3x + 1$.

75) If $f(x) = x^2 + 3x$ than show that $\Delta f(x) = 2x + 4$

76) Find the missing entry in the following table

x	0	1	2	3	4
y_x	1	3	9	-	81

77) Following are the population of a district

Year (x)	1881	1891	1901	1911	1921	1931
Population (y) Thousands	363	391	421	-	467	501

78) Using graphic method, find the value of y when x = 48 from the following data:

x	40	50	60	70
y	6.2	7.2	9.1	12

79) The following data relates to indirect labour expenses and the level of output

Months	Jan	Feb	Mar	Apr	May	June
Units of output	200	300	400	640	540	580
Indirect labour expenses (Rs)	2500	2800	3100	3820	3220	3640

Estimate the expenses at a level of output of 350 units, by using graphic method

80) A second degree polynomial passes though the point (1,-1) (2,-1) (3,1) (4,5). Find the polynomial.

81) From the following data, estimate the population for the year 1986 graphically.

year	1960	1970	1980	1990	2000
Population (in thousands)	12	15	20	26	33

82) Using graphic method, find the value of y when x=27.

x	10	15	20	25	30
y	35	32	29	26	23

83) Find y when x = 0.2 given that

x	0	1	2	3	4
y	176	185	194	202	212

84) If $y_{75} = 2459$, $y_{50} = 2018$, $y_{85} = 1180$, and $y_{90} = 402$, find y_{82}

x	75	80	85	90
y	2459	2018	1180	402

85) Find the number of men getting wages between Rs.30 and Rs.35 from the following table.

Wages (x)	20 - 30	30 - 40	40 - 50	50 - 60
No. of men (y)	9	30	35	42

86) Estimate the population for the year 1995.

year (x)	1961	1971	1981	1991	2001
population in thousands (y)	46	66	81	93	101

31 x 5 = 155

87) Using Newton's formula for interpolation estimate the population for the year 1905
from the table:

Year	1891	1901	1911	1921	1931
Population	98.752	1,32,285	1,68,076	1,95,670	2,46,050

88) The values of y= f(x)for x = 0,1,2, ...,6 are given by

x	0	1	2	3	4	5	6
y	2	4	10	16	20	24	38

Estimate the value of y (3.2) using forward interpolation formula by choosing the four values that will give the best approximation

89) From the following table find the number of students who obtained marks less than 45.

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

90) Using appropriate interpolation formula find the number of students whose weight is between 60 and 70 from the data given below

Weight in lbs	0-40	40-60	60-80	80-100	100-120
No.of.students	250	120	100	70	50

91) The population of a certain town is as follows

Year : x	1941	1951	1961	1971	1981	1991
Population in lakhs:y	20	24	29	36	46	51

Using appropriate interpolation formula, estimate the population during the period 1946.

92) Evaluate $\Delta\left[\frac{5x+12}{x^2+5x+6}\right]$ by taking '1' as the interval of differencing.

93) The following data are taken from the steam table

Tempreture C^0	140	150	160	170	180
Pressure kg flcm^2	3.685	4.854	6.302	8.076	10.225

Find the pressure at temperature t = 175^0

94) Calculate the value of y when x = 7.5 from the table given below

x	1	2	3	4	5	6	7	8
y	1	8	27	64	125	216	343	512

95) From the following table of half- yearly premium for policies maturing at different ages. Estimate the premium for policies maturing at the age of 63.

Age	45	50	55	60	65
Premium	114.84	96.16	83.32	74.48	63.48

96) Find a polynomial of degree two which takes the values

x	0	1	2	3	4	5	6	7
y	1	2	4	7	11	16	22	29

97) Estimate the production for 1964 and 1966 from the following data

Year	1961	1962	1963	1964	1965	1966	1967
Production	200	220	260	-	350	-	430

98) Evaluate $\Delta\left[\frac{1}{(x+1)(x+2)}\right]$ by taking '1' as the interval of differencing

99) Find the missing entries from the following

x	0	1	2	3	4	5
y = f(x)	0	-	8	15	-	35

100) Using Newton's forward interpolation formula find the cubic polynomial.

x	0	1	2	3
f(x)	1	2	1	10

101) The population of a city in a censes taken once in 10 years is given below. Estimate the population in the year 1955.

Year	1951	1961	1971	1981
Population in lakhs	35	42	58	84

102) In an examination the number of candidates who secured marks between certain interval were as follows

Marks	0-19	20-39	40-59	60-79	80-99
No.of.candidates	41	62	65	50	17

103) Find the value of f (x) when x = 32 from the following table

x	30	35	40	45	50
f(x)	15.9	14.9	14.1	13.3	12.5

104) The following data gives the melting point of a alloy of lead and zinc where 't' is the temperature in degree c and P is the percentage of lead in the alloy

P	40	50	60	70	80	90
T	180	204	226	250	276	304

Find the melting point of the alloy containing 84 percent lead.

105) Find f(2.8) from the following table.

x	0	1	2	3
f(x)	1	2	11	34

106) Using interpolation estimate the output of a factory in 1986 from the following data

Year	1974	1978	1982	1990
Output in 1000 tones	25	60	80	170

107) Using interpolation, find the value of f(x) when x = 15

x	3	7	11	19
f(x)	42	43	47	60

108) Find the missing figures in the following table

x	0	5	10	15	20	25
y	7	11	-	18	-	32

109) Find f(0.5) if f(−1) = 202, f (0)= 175, f(1) = 82 and f(2) = 55

110) From the following table obtain a polynomial of degree y in x

x	1	2	3	4	5
y	1	-1	1	-1	1

111) If $u_0 = 560$, $u_1 = 556$, $u_2 = 520$, $u_4 = 385$, show that $u_3 = 465$

112) From the following data find y at x = 43 and x = 84

x	40	50	60	70	80	90
y	184	204	226	250	276	304

113) The area A of circle of diameter ‘d’ is given for the following values

D	80	85	90	95	100
A	5026	5674	6362	7088	7854

114) Estimate the production for 1962 and 1965 from the following data

year	1961	1962	1963	1964	1965	1966	1967
Production in tonnes	200	-	260	306	-	390	430

115) From the following data, calculate the value of $e^{1.75}$

x	1.7	1.8	1.9	2.0	2.1
e^x	5.474	6.050	6.686	7.386	8.166

116) From the data, find the number of students whose height is between 80 cm and 90 em

Height in cm (x)	40-60	60-80	80 - 100	100-120	120-140
No. of. students (y) :	250	120	100	70	50

117) From the following table, estimate the premium for a policy maturing at the age of 58.

Age (x)	40	45	50	55	60
Premium (y)	114.84	96.16	83.32	74.48	68.48

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