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**Numerical Methods FULL** Date : 11-Nov-19

12th Standard

Business Maths

Reg.No. : | | | | | | |

Exam Time : 03:00:00 Hrs Total Marks : 100

20 x 1 = 20

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) $E \equiv$

(a) $1 + \Delta$ (b) $1 - \Delta$ (c) $1 + \nabla$ (d) $1 - \nabla$

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 $\Delta c =$

(a) c (b) $\Delta$ (c) $\Delta^2$ (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) $\Delta f(x)$

8) $E f(x) =$

(a) $f(x-h)$ (b) $f(x)$ (c) $f(x+h)$ (d) $f(x+2h)$

9) $\nabla \equiv$

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

10) $\nabla f(a) =$

(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) $y(x) = \frac{x_1-x_0}{x_0-x_1}y_0 + \frac{x_1-x_0}{x_1-x_0}y_1$ (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 $\Delta f(x)$

(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) $\Delta$ can be defined as $\Delta f(x) = f(x+h) - f(x)$ where h is the __________ interval of spacing

(a) equal (b) unequal (c) equal & unequal (d) equal or unequal

16) If c is a constant, then $\Delta c =$

(a) $c.\Delta$ (b) $c.\nabla$ (c) 0 (d) 1

17) $E[f(x_0)]$ is

(a) $f(x_o + h)$ (b) $f(x_o - h)$ (c) $f(x_o) + h$ (d) $f(x_o) - h$

18) 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

19) The backward difference operator ∇ is

(a) Nepla (b) Alpha (c) Gamma (d) Delta

20) $\Delta (1 / x)$ where $h = 1$ is ___________

(a) $\frac{-1}{x(x+1)}$ (b) $\frac{1}{x(x+1)}$ (c) $\frac{2}{(x)(x+1)}$ (d) $\frac{2}{x(x+1)(x+2)}$

8 x 2 = 16

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

22) 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.

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

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

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

26) Find the missing entry in the following table

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

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

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

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

8 x 3 = 24

29) Construct a forward difference table for the following data

| | | | | |
|---|---|---|---|---|
| x | 0 | 10 | 20 | 30 |
| y | 0 | 0.174 | 0.347 | 0.518 |

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

31) 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…

32) Find (i) $\Delta e^{ax}$

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

(iii) $\Delta \log x$

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

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

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

36) 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 |

8 x 5 = 40

37) 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 |

38) 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

39) 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 |

40) 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 = $175^0$

41) Using Lagrange’s interpolation formula find y(10) from the following table:

| | | | | |
|---|---|---|---|---|
| x | 5 | 6 | 9 | 11 |
| y | 12 | 13 | 14 | 16 |

42) 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 |

43) 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 |

44) Using Lagrange's formula find the value of y when x = 4 from the following table.

| | | | | | |
|---|---|---|---|---|---|
| x | 0 | 3 | 5 | 6 | 8 |
| y | 276 | 460 | 414 | 343 | 110 |

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