



RAN - 2103000203023002



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B. Sc. (Sem. - III) Examination

March - 2023

Mathematics - VI : MTH - 302

[Total Marks: 50

સૂચના : / Instructions

(1)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fill up strictly the details of signs on your answer book

Name of the Examination:

B. Sc. (Sem. - III)

Name of the Subject :

Mathematics - VI : MTH - 302

Subject Code No.: **2103000203023002**

Seat No.:

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Student's Signature

- (2) *The question paper has Two sections and 33 questions in all.*
- (3) *Que. 1 to 16 are of One mark each and Que. 17 to 33 are of Two marks each.*
- (4) *All sections and questions are compulsory.*
- (5) *Follow usual notations.*
- (6) *Use of non-programmable calculator is allowed.*

**O.M.R. Sheet ભરવા અંગેની અગત્યની સૂચનાઓ આપેલ
O.M.R. Sheetની પાછળ છાપેલ છે.**

**Important instructions to fillup O.M.R. Sheet
are given on back side of the provided O.M.R. Sheet.**

Section A (16 Questions) (Total 16 Marks)
(Each question carries ONE mark)

Q. (1) $E - \Delta = \underline{\hspace{2cm}}$.

- (a) 1 (c) ∇
(b) $E\delta$ (d) None of these

Q. (2) $\Delta y_3 = \underline{\hspace{2cm}}$.

- (a) ∇y_1 (c) ∇y_3
(b) ∇y_2 (d) None of these

Q. (3) $\Delta f(x) = \underline{\hspace{2cm}}$, where $f(x) = c$ (constant).

- (a) $f(x+c) - f(x)$ (c) $cf(1)$
(b) $f(c+h) - f(c)$ (d) 0

Q. (4) Which of the following is true?

- (a) $\log_e E = \frac{1}{h} D$ (c) $h \log_e E = D$
(b) $\log_e E = hD$ (d) None of these

Q. (5) μ is known as

- (a) An average operator (c) A shift operator
(b) A central operator (d) None of these

Q. (6) The process of finding the values within the interval (x_0, x_n) is called

- (a) Interpolation method (c) Iterative method
(b) Extrapolation method (d) None of these

Q. (7) If $(0, 12)$, $(1, 14)$ and $(2, 16)$ then $\Delta^2 y_0 = \underline{\hspace{2cm}}$.

- (a) 12 (c) 0.2
(b) 0 (d) None of these

Q. (8) Which of the following is true?

- (a) $\nabla y_n = y_n - y_{n+1}$ (c) $\nabla y_n = y_n + y_{n-1}$
(b) $\nabla y_n = y_{n+1} - y_n$ (d) $\nabla y_n = y_n - y_{n-1}$

Q. (9) $E_R = \underline{\hspace{2cm}}$.

- (a) $\frac{E_P}{X}$ (c) $\frac{\delta X}{X} \times 100$
(b) $\frac{E_A}{X}$ (d) None of these

Q. (10) The root of the equation $e^x = 4 + x$ lies within the interval

- (a) (1, 2) (c) (-1, 0)
(b) (0, 1) (d) None of these

Q. (11) An absolute error is defined by

- (a) $E_R - E_P$ (c) $\frac{X}{X_1}$
(b) $E_A - E_R$ (d) $|X - X_1|$

Q. (12) Round off 5.001500 correct to 4 significant figures.

- (a) 5.002 (c) 0.0015
(b) 5.001 (d) None of these

Q. (13) If we want to solve $x^2 - 7 = 0$ using Newton-Raphson method and the initial point is $x_0 = 2.5$, then the subsequent estimate of x (i.e. x_1) will be

- (a) 2.65 (c) 2.25
(b) 2.55 (d) None of these

Q. (14) The root of the equation $x^3 - x - 2 = 0$ lies within the interval

- (a) (0, 1) (c) (1, 2)
(b) (-1, 0) (d) Root does not exist

Q. (20) $\Delta[f(x)] = \underline{\hspace{2cm}}$.

(a) $\frac{\Delta[f(x)]}{f(x)f(x+h)}$

(c) $-\frac{\Delta[f(x)]}{f(x)f(x+h)}$

(b) $-\frac{\Delta[f(x)]}{f(x)f(x-h)}$

(d) 0

Q. (21) $\frac{(\Delta + \nabla)}{2} = \underline{\hspace{2cm}}$.

(a) δ^{-1}

(c) $\mu\delta$

(b) $E\mu$

(d) None of these

Q. (22) $\Delta^2 x^3 = \underline{\hspace{2cm}}$, ($h = 1$)

(a) $6(1+x)$

(c) $6(2+x)$

(b) $6(1-x)$

(d) None of these

Q. (23) $\nabla(e^{ax}) = \underline{\hspace{2cm}}$; $h = 1$.

(a) $e^{a(x-1)}(e-1)$

(c) $e^{a(x-1)}(e^a-1)$

(b) $e^{a(x+2)}(e-1)$

(d) None of these

Q. (24) $\Delta^2 y_n = \underline{\hspace{2cm}}$.

(a) $(E-1)^2 y_n$

(c) $(E^2 - 2E - 1)y_n$

(b) $(E+1)^2 y_n$

(d) None of these

Q. (25) If $X = 0.51$ and is correct to 2 decimal places, then the percentage accuracy is $\underline{\hspace{2cm}}$.

(a) 0.98%

(c) 9.8%

(b) 98%

(d) None of these

Q. (26) The relative error in the sum of the numbers 1.732, 2.236 and 2.646 to four significant digits is _____.

- (a) 0.15 (c) 0.015
(b) 0.005 (d) 0.0015

Q. (27) An absolute error in the quotient $\frac{a}{b}$ is given by _____.

- (a) $\frac{a}{b} \left(\frac{E_A^1}{a} - \frac{E_A^2}{b} \right)$ (c) $\frac{a}{b} \left(\frac{E_A^1}{b} - \frac{E_A^2}{a} \right)$
(b) $\frac{b}{a} \left(\frac{E_A^1}{a} - \frac{E_A^2}{b} \right)$ (d) $\frac{b}{a} \left(\frac{E_A^1}{b} - \frac{E_A^2}{a} \right)$

Q. (28) If two numbers are given as 2.5 and 48.289, both of which being correct to the significant figures given, then their product is _____.

- (a) 0.12×10^2 (c) 12×10^2
(b) 1.2×10^2 (d) None of these

Q. (29) If we apply bisection method to solve the equation $x^3 - x - 2 = 0$, then the third iteration $x_2 =$ _____.

- (a) 1.625 (c) 1.5
(b) 1.75 (d) None of these

Q. (30) When we express the equation $f(x) = 0$ in the form $x = \phi(x)$ for iteration method, then $\phi(x)$ must be such that

- (a) $|\phi'(x)| < 1$ (c) $|\phi'(x)| = 1$
(b) $|\phi'(x)| > 1$ (d) None of these

Q. (31) One of the real roots of the equation $x^3 - 3x - 3 = 0$ lies in _____.

- (a) (0, 1) (c) (-1, 0)
(b) (1, 2) (d) (2, 3)

Q. (32) Newton-Raphson formula to solve the equation $x = e^{-x}$ is _____.

- (a) $x_{n+1} = x_n + \frac{x_n - e^{-x_n}}{1 + e^{-x_n}}$ (c) $x_{n+1} = \frac{1 + x_n}{1 + e^{x_n}}$
 (b) $x_{n+1} = x_n - \frac{x_n - e^{-x_n}}{1 + e^{-x_n}}$ (d) None of these

Q. (33) Guass's Backward interpolation formula is _____

- (a) $y(x) = y_0 + p\Delta y_{-1} + \frac{p(p+1)}{2!}\Delta^2 y_{-1} + \frac{(p+1)p(p-1)}{3!}\Delta^3 y_{-2} + \frac{(p+2)(p+1)p(p-1)}{4!}\Delta^4 y_{-2} + \dots$
 (b) $y(x) = y_0 + p\Delta y_{-1} + \frac{p(p+1)}{2!}\Delta^2 y_{-2} + \frac{(p+1)p(p-1)}{3!}\Delta^3 y_{-2} + \frac{(p+2)(p+1)p(p-1)}{4!}\Delta^4 y_{-3} + \dots$
 (c) $y(x) = y_0 + p\Delta y_{-1} + \frac{p(p-1)}{2!}\Delta^2 y_{-1} + \frac{(p+1)p(p-1)}{3!}\Delta^3 y_{-2} + \frac{(p+1)p(p-1)(p-2)}{4!}\Delta^4 y_{-2} + \dots$
 (d) $y(x) = y_0 + p\Delta y_{-1} + \frac{p(p-1)}{2!}\Delta^2 y_{-2} + \frac{(p+1)p(p-1)}{3!}\Delta^3 y_{-2} + \frac{(p+1)p(p-1)(p-2)}{4!}\Delta^4 y_{-3} + \dots$

SPACE FOR ROUGH WORK