



RAN - 1903000203040056



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S. Y. B. Sc. (A.T.K.T.) (Sem. - III) Examination

March - 2023

Mathematics

Mathematical Methods (GE)

Time: 2 Hours]

[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:

S. Y. B. Sc. (A.T.K.T.) (Sem. - III)

Name of the Subject :

Mathematics - Mathematical Methods (GE)

Subject Code No.: **1903000203040056**

Seat No.:

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Student's Signature

- (2) All questions are compulsory.
- (3) Q. 1 to 16 Multiple Choice question Each carry 1 Mark.
- (4) Q. 17 to 33 Multiple Choice question Each carry 2 Marks.

***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.***

- Q. 1.** A curve Y passes through the points $(1, -3)$ and $(3, -5)$ then $\nabla Y_1 =$
 (A) -5 (B) -3
 (C) -2 (D) 2
- Q. 2.** If $f(x) = k$ is a constant function then $\Delta f(x)$ is
 (A) 1 (B) 0
 (C) k (D) 2
- Q. 3.** Which of the following relation between ∇ and E is true
 (A) $E = \nabla - I$ (B) $E = I - \nabla$
 (C) $E^{-1} = I - \nabla$ (D) $E^{-1} = \nabla$
- Q. 4.** Which of the following relation is false
 (A) $\delta = \nabla E^{1/2}$ (B) $\mu = \frac{1}{2}(E^{1/2} - E^{-1/2})$
 (C) $E^{-1} = I - \nabla$ (D) $\delta = E^{-1/2} \Delta$
- Q. 5.** If $f(x) = \cos x$, $h = \pi/2$ then $E f(x)$
 (A) $\sin x$ (B) $-\cos x$
 (C) $-\sin x$ (D) $\cos x$
- Q. 6.** If roots of auxiliary equation of a difference equation are 1 and 2, its CF is
 (A) $c_1 + c_2 2^k$ (B) $c_1 c_2 2^k$
 (C) $c_1 + c_2 k$ (D) $c_1 + c_2$
- Q. 7.** $\Delta x^{(3)} =$
 (A) $x^{(2)}$ (B) $3x^{(2)}$
 (C) $3x^2$ (D) $x^{(3)} - x^{(2)}$
- Q. 8.** If $f(x) = x^2 + 3x + 3$ is expressed in to factorial notation $ax^{(2)} + bx^{(1)} + c$ then value of the constant c is
 (A) 3 (B) 0
 (C) 2 (D) 1
- Q. 9.** $\Delta\left(\frac{1}{x}\right) = \underline{\hspace{2cm}}$, $h = 1$
 (A) $-\frac{1}{x(x+1)}$ (B) $\frac{1}{x(x+1)}$
 (C) $\frac{x+1}{x}$ (D) $\frac{x-1}{x}$

- Q. 10.** $\mu Y_{1/2} =$
- (A) $\frac{1}{2}(Y_1 - Y_0)$ (B) $\frac{1}{2}(Y_1 + Y_0)$
- (C) $(Y_1 - Y_0)$ (D) $\frac{1}{2}(Y_{1/2} - Y_{-1/2})$
- Q. 11.** If $\Delta^n x^{(m)} = 0$ then
- (A) $n < m$ (B) $n \leq m$
- (C) $n \geq m$ (D) $n > m$
- Q. 12.** Operator Δ is equivalent to
- (A) ΔE (B) δE
- (C) ∇E (D) δE^{-1}
- Q. 13.** $\Delta^5 x^4 =$
- (A) 0 (B) $20x^3$
- (C) 20 (D) $4x^3$
- Q. 14.** $\nabla Y_5 =$
- (A) ΔY_3 (B) ΔY_4
- (C) δY_4 (D) ΔY_5
- Q. 15.** Degree of $y_{x+3}^5 - 7y_{x+2}^2 - 2y_{x-1} = 0$
- (A) 5 (B) 3
- (C) 2 (D) 4
- Q. 16.** $\delta^{k/2} Y_r =$
- (A) $\nabla^{k/2} Y_{r+1/2}$ (B) $\nabla^{k/2} Y_{r-1/2}$
- (C) $\nabla^{k/2} Y_{r/2}$ (D) $\Delta^{k/2} Y_{r+1/2}$
- Q. 17.** $\Delta^3 \{(2x-1)(x+1)(2+3x)\} = \underline{\hspace{2cm}}, h = 1$
- (A) 12 (B) 6
- (C) 18 (D) 36
- Q. 18.** $\delta^2 E =$
- (A) Δ^2 (B) ∇^2
- (C) Δ (D) ∇

- Q. 19.** If $\Delta y = x^2 + x + 3$ then $\Delta^2 y = \underline{\hspace{2cm}}$, $h = 1$
 (A) $2x$ (B) $2x + 2$
 (C) 2 (D) 0
- Q. 20.** Order and degree of $y_{x+5}^4 - 3y_{x+2}^2 - 7y_{x-1} = 0$
 (A) $4, 5$ (B) $4, 6$
 (C) $6, 4$ (D) $4, 2$
- Q. 21.** General solution of $y_{x+2} + y_x = 0$ is $y = \underline{\hspace{2cm}}$.
 (A) $\text{Cos}(C_1 + kC_2)$ (B) $C_1 \text{Cos}(kC_2)$
 (C) $\text{Cos}(k\pi/2 + C_2)$ (D) $C_1 \text{Cos}(k\pi/2 + C_2)$
- Q. 22.** If $Y = a_0 + a_1x + a_2x^2 + \underline{\hspace{2cm}} + a_nx^n$, $h =$ length of interval then $\Delta^n Y = \underline{\hspace{2cm}}$.
 (A) $a_n n!h^n$ (B) $n!h^n$
 (C) $a_n n!$ (D) $a_n n!h$
- Q. 23.** Particular Integral of $y_{k+3} + y_{k+2} + 3y_k = 2^k$ is $y = \underline{\hspace{2cm}}$.
 (A) $2^{k/15}$ (B) $2k$
 (C) $2^k/15$ (D) $k/15$
- Q. 24.** $\Delta \log Y_x = \underline{\hspace{2cm}}$, $h = 1$
 (A) $\log\left(1 - \frac{Y_{x+1}}{Y_x}\right)$ (B) $\log\left(\frac{Y_{x+1}}{Y_x} + 1\right)$
 (C) $\log\left(1 + \frac{\Delta Y_x}{Y_x}\right)$ (D) $\log\left(\frac{Y_{x+1}}{Y_x} - 1\right)$
- Q. 25.** If $f(x) = 2x^2 - 3x + 1$, then its factorial expression is
 (A) $2x^{(2)} - x^{(1)} + 1$ (B) $2x^{(2)} + x^{(1)} + 1$
 (C) $2x^{(2)} - 3x^{(1)} + 1$ (D) $2x^{(2)} - x^{(1)} - 1$
- Q. 26.** Order and degree of the difference equation $(y_{x+3})^4 + 2y_{x+2} - 6y_x = 0$ is _____.
 (A) $3, 4$ (B) $0, 4$
 (C) $4, 3$ (D) $2, 4$

- Q. 27.** If two roots of auxiliary equation of a difference equation are repeated then its complementary function is
- (A) $(c_1 + c_2)ka^x$ (B) $(c_1 + c_2k)a^k$
 (C) $(c_1 + c_2k)k^a$ (D) $(c_1 - c_2k)k^x$
- Q. 28.** $x^{(-1)} = \underline{\hspace{2cm}}$ $h = 1$
- (A) $\frac{x}{x+1}$ (B) $\frac{x+1}{2}$
 (C) $\frac{x+1}{x}$ (D) $\frac{1}{x+1}$
- Q. 29.** $\Delta^2(x+1)^2 = \underline{\hspace{2cm}}$ $h = 1$
- (A) 2 (B) $2x + 2$
 (C) $2x$ (D) $2x + 1$
- Q. 30.** General solution of $y_{k+3} - 3y_{k+2} + 3y_{k+1} - y_k = 0$
- (A) $c_1c_2c_3k^3$ (B) $c_1x + c_2k^2 + c_3k^3$
 (C) $(c_1 + c_2 + c_3)k$ (D) $c_1 + c_2k + c_3k^2$
- Q. 31.** $\left(\frac{\Delta}{E}\right)x = \underline{\hspace{2cm}}$ $h = 1$
- (A) x (B) 1
 (C) 2 (D) 0
- Q. 32.** $\Delta^2e^{-2x} = \underline{\hspace{2cm}}$, $h = 1$
- (A) $e^{-2x}(e^{-2} - 1)^2$ (B) $e^{-2x}(e^{-2} + 1)^2$
 (C) $e^{2x}(e^{-2} + 1)^2$ (D) $e^{-2x}(e^{-2x} + 1)^2$
- Q. 33.** Which of the following relation is correct
- (A) $\mu = \sqrt{1 - \delta^2/4}$ (B) $\mu = \sqrt{1 + \delta^2/4}$
 (C) $\mu = \sqrt{1 + \delta^2}$ (D) $\mu = 1 + \delta^2/4$

SPACE FOR ROUGH WORK