RAN-2003000201030033

**B**

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## F. Y. B. Sc. (Sem. - I) Examination

## March - 2023

## Mathematics - I : (MTH - 101)

**Time: 1 Hour ]** **[ 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:

☛ **F. Y. B. Sc. (Sem. - I)**

Name of the Subject :

☛ **Mathematics - I : (MTH - 101)**

Subject Code No.: **2003000201030033**

Seat No.:

Student's Signature

(2) Follow usual notations and conventions.

(3) There is no negative marking for wrong answer.

(4) There are total 33 questions.

(5) Section - I contains 16 MCQs (1 to 16) each of which carries a weightage of 1 mark.

(6) Section - II contains 17 MCQs (17 to 33) each of which carries a weightage of 2 marks.

***O.M.R. Sheet* ભરવા અંગેની અગત્યની સૂચનાઓ આપેલ**
***O.M.R. Sheet*ની પાછળ છાપેલ છે.**
***Important instructions to fillup O.M.R. Sheet***
***are given on back side of the provided O.M.R. Sheet.***

## Section - I

**Q. 1.** Real part of $e^{i\pi}$ is equal to _____.

$e^{i\pi}$ નો વાસ્તવિક ભાગ _____ છે.

A. $-1$ B. $0$

C. $1$ D. $2$

**Q. 2.** $1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots + \frac{x^r}{r!} + \cdots$, is the expansion of _____.

$1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots + \frac{x^r}{r!} + \cdots$ એ _____ નું વિસ્તરણ છે.

A. $\log(x)$ B. $sin(x)$

C. $e^x$ D. $\cos(x)$

**Q. 3.** $tanh^{-1}\left\{\frac{x-a}{x+a}\right\}$ = _____.

A. $\log\frac{x}{a}$ B. $\log\frac{x}{a^2}$

C. $\frac{1}{2}\log\frac{x}{a}$ D. $2\log\frac{x}{a}$

**Q. 4.** $tanh^{-1} x$ = _____.

A. $\sinh^{-1}\frac{x}{\sqrt{1-x^2}}$ B. $\sinh^{-1}(x)$

C. $\sinh^{-1}(1-x^2)$ D. $\sinh^{-1}(x^{-1})$

**Q. 5.** $\left[\cos\pi/4 + \sin\pi/4\right]^2$ = _____.

A. $-i$ B. $1$

C. $i$ D. $-1$

**Q. 6.** $tanh(ix)$ = _____.

A. $i\tan x$ B. $\tan ix$

C. $-\tan x$ D. $-i\tan x$

**Q. 7.** $(cos\,2\theta + i\,sin\,2\theta)^{-2}$ = _____.

A. $cos\,4\theta + i\,sin\,4\theta$ B. $cos\,4\theta - i\,sin\,4\theta$

C. $cos\,2\theta + i\,sin\,2\theta$ D. $cos\,2\theta + sin\,2\theta$

**Q. 8.** $\frac{e^x - e^{-x}}{2}$ = _____.

A. $\cosh x$

B. $\sinh x$

C. $\tanh x$

D. $\coth x$

**Q. 9.** $\frac{2\tan\theta}{1-\tan^2\theta}$ = _____.

A. $\tan\theta$

B. $\tan 2\theta$

C. $-\tan\theta$

D. $-\tan 2\theta$

**Q. 10.** $(1+x)^n$ = _____.

A. 2

B. 1

C. $1+x$

D. $1 + n_{c_1}\, x + n_{c_2} x^2 + \cdots + n_{c_r} x^r + \cdots + x^n$

**Q. 11.** If $x = \cos\theta + i \sin\theta$ then $x^{-n}$ = _____.

જો $x = \cos\theta + i \sin\theta$ હોય તો $x^{-n}$ = _____.

A. $\cos n\theta + i \sin n\theta$

B. $\cos\theta - i \sin n\theta$

C. $\cos n\theta - i \sin n\theta$

D. $\cos n\theta + i \sin\theta$

**Q. 12.** $\cosh \frac{A}{2}$ = _____.

A. $\sinh \frac{A}{2}$

B. $\pm\sqrt{\frac{1+\cosh A}{2}}$

C. $\cosh A$

D. $2 \cosh A$

**Q. 13.** $\tanh^{-1}x + \tanh^{-1}y$ is equal to _____.

A. $\tanh^{-1}\left(\frac{x+y}{1+xy}\right)$

B. $\tanh^{-1}(x+y)$

C. $\tanh^{-1}(x-y)$

D. $\tanh^{-1}(1+xy)$

**Q. 14.** $cosh^2\theta - \sinh^2\theta$ is equal to _____.

A. 1 B. 0

C. –1 D. 2

**Q. 15.** $(x + iy) \cdot (x - iy)$ is equal to _____.

A. $x^2$ B. $x^2 + y^2$

C. $x^2 - y^2$ D. $y^2$

**Q. 16.** $sech^2u + tanh^2u$ is equal to _____.

A. –1 B. 0

C. 1 D. 2

## Section - II

**Q. 17.** The last term in the expansion of $\cos 8\theta$ is _____.

$\cos 8\theta$ ના વિસ્તરણમાં અંતિમ પદ _____ છે.

A. $cos^8\theta$ B. $sin^8\theta$

C. $-cos^8\theta$ D. $-sin^8\theta$

**Q. 18.** If $z = \cos 30° + i\ sin\, 30°$ then $z^7$ = _____.

જો $z = \cos 30° + i\ sin\, 30°$ હોય તો $z^7$ = _____.

A. $-\frac{\sqrt{3}}{2} + i\frac{1}{2}$ B. $\frac{\sqrt{3}}{2} + i\frac{1}{2}$

C. $-\frac{\sqrt{3}}{2} - i\frac{1}{2}$ D. $\frac{\sqrt{3}}{2} - i\frac{1}{2}$

**Q. 19.** If $x = cos\,\theta + i\ sin\,\theta$ then $\frac{x^2-1}{x^2+1}$ = _____.

જો $x = cos\,\theta + i\ sin\,\theta$ હોય તો $\frac{x^2-1}{x^2+1}$ = _____.

A. $\tan\theta$ B. $i\tan\theta$

C. $-\tan\theta$ D. $-i\tan\theta$

**Q. 20.** Expression of $\cos 4\theta$ in terms of $\cos\theta$ and $\sin\theta$ is _____.

$\cos 4\theta$ નું $\cos\theta$ અને $\sin\theta$ ના પદમાં વિસ્તરણ _____ છે.

A. $cos^4\theta + 6cos^2\theta\, sin^2\theta + sin^4\theta$

B. $cos^4\theta - 6cos^2\theta\, sin^2\theta + sin^4\theta$

C. $cos^4\theta + 4cos^2\theta\, sin^2\theta + sin^4\theta$

D. $cos^4\theta - 4cos^2\theta\, sin^2\theta + sin^4\theta$

**Q. 21.** $\cos 51° =$ _____.

A. 0.6370 B. 0.6730

C. 0.6037 D. 0.6370

**Q. 22.** $\coth A(1 + tanh^2 A) - tanh A(1 + coth^2 A) =$ _____.

A. –1 B. 0

C. 1 D. 2

**Q. 23.** If $x + iy = \sin(u + iv)$ then $\frac{x^2}{cosh^2 v} + \frac{y^2}{sinh^2 v} =$ _____.

જો $x + iy = \sin(u + iv)$ હોય તો $\frac{x^2}{cosh^2 v} + \frac{y^2}{sinh^2 v} =$ _____.

A. –1 B. 0

C. 1 D. 2

**Q. 24.** If $\tan(\alpha + i\beta) = x + iy$ then $x^2 + y^2 + 2x \cot 2\alpha =$ _____.

જો $\tan(\alpha + i\beta) = x + iy$ હોય તો $x^2 + y^2 + 2x \cot 2\alpha =$ _____.

A. 1 B. 0

C. –1 D. 2

**Q. 25.** $\cosh^{-1} x =$ _____.

A. $1n(x + \sqrt{x^2 - 1})$ B. $1n(x - \sqrt{x^2 - 1})$

C. $1n(x + \sqrt{x^2 + 1})$ D. $1n(x - \sqrt{x^2 + 1})$

**Q. 26.** $cosh^4 A - sinh^4 A =$ _____.

A. $2\,cosh^2 A$ B. $2\,cosh^2 A - 1$

C. $2\,cosh^2 A + 1$ D. $cosh^2 A$

**Q. 27.** $(1 + i)^5 =$ _____.

A. $4(1 + i)$ B. $-4(1 - i)$

C. $-4(1 + i)$ D. $4(1 - i)$

**Q. 28.** $\dfrac{(cos\,\theta - i\,sin\,\theta)^5}{(cos\,\alpha + i\,sin\,\alpha)^7} =$ _____.

A. $cos(5\theta + 7\alpha) - i\,sin(5\theta + 7\alpha)$

B. $sin(5\theta + 7\alpha)$

C. $sin(5\theta + 7\alpha) + i\,cos(5\theta + 7\alpha)$

D. $cos(5\theta + 7\alpha)$

**Q. 29.** $2\cos\dfrac{C+D}{2}\sin\dfrac{C-D}{2} =$ _____.

A. $\sin C - \sin D$ B. $\sin C + \sin D$

C. $\cos C - \cos D$ D. $\cos C + \cos D$

**Q. 30.** If $y = \tan\alpha \tanh\beta$ and $z = \cot\alpha \tanh\beta$ then $\tan(y + z) =$ _____.

જો $y = \tan\alpha \tanh\beta$ અને $z = \cot\alpha \tanh\beta$ હોય તો $\tan(y + z) =$ _____.

A. $\sin\alpha \cosh\beta$ B. $\text{cosec}\,2\alpha \sinh 2\beta$

C. $\cos\alpha \cosh\beta$ D. $\sin 2\alpha \cosh\beta$

**Q. 31.** If $\sin(\alpha + i\beta) = \cos\theta + i\sin\theta$ then $\cos^2\alpha =$ _____.

જો $\sin(\alpha + i\beta) = \cos\theta + i\sin\theta$ હોય તો $\cos^2\alpha =$ _____.

A. $\cos\theta$ B. $\sin\theta$

C. $\sec\theta$ D. $\tan\theta$

**Q. 32.** If $a + ib = c \tan(x + iy)$ then $\tan 2x =$ _____.

જો $a + ib = c \tan(x + iy)$ હોય તો $\tan 2x =$ _____.

A. $\frac{2ca}{c^2 - a^2 - b^2}$

B. $2ca$

C. $\frac{2ca}{c^2 + a^2 - b^2}$

D. $\frac{2a}{c^2 - a^2 - b^2}$

**Q. 33.** $\{(\cos\theta + \cos\varphi) + i(\sin\theta + \sin\varphi)\}^n + \{(\cos\theta + \cos\varphi) - i(\sin\theta + \sin\varphi)\}^n =$ _____.

A. $2^{n+1} \cos^n\left(\frac{\theta - \varphi}{2}\right) \cos n\left(\frac{\theta + \varphi}{2}\right)$

B. $\cos^n\left(\frac{\theta - \varphi}{2}\right) \cos n\left(\frac{\theta + \varphi}{2}\right)$

C. $2^n \cos^n\left(\frac{\theta - \varphi}{2}\right) \cos n\left(\frac{\theta + \varphi}{2}\right)$

D. $2^{n+1} \cos n\left(\frac{\theta + \varphi}{2}\right)$

_____

**SPACE FOR ROUGH WORK**