RAN-2003000201030033

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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. $tanh^{-1} x =$ _____.

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

A. $-i$

B. 1

C. i

D. –1

Q. 3. $tanh(ix) =$ _____.

A. $i \tan x$

B. $\tan ix$

C. $-\tan x$

D. $-i \tan x$

Q. 4. $(cos\ 2\theta + i\ sin\ 2\theta)^{-2} =$ _____.

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. 5. $\frac{e^x - e^{-x}}{2} =$ _____.

A. $\cosh x$

B. $\sinh x$

C. $\tanh x$

D. $\coth x$

Q. 6. $\frac{2\tan\theta}{1-\tan^2\theta} =$ _____.

A. $\tan\theta$

B. $\tan 2\theta$

C. $-\tan\theta$

D. $-\tan 2\theta$

Q. 7. $(1+x)^n =$ _____.

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. 8. 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. 9. $cosh\,\frac{A}{2}$ = _____.

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

C. $cosh\,A$ D. $2\,cosh\,A$

Q. 10. $tanh^{-1}x + tanh^{-1}y$ 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. 11. $cosh^2\theta - \sinh^2\theta$ is equal to _____.

A. 1 B. 0

C. –1 D. 2

Q. 12. $(x + iy) \cdot (x - iy)$ is equal to _____.

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

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

Q. 13. $sech^2u + tanh^2u$ is equal to _____.

A. –1 B. 0

C. 1 D. 2

Q. 14. 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. 15. $1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots + \frac{x^r}{r!} + \cdots$, 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. 16. $tanh^{-1}\left\{\frac{x-a}{x+a}\right\}$ = _____.

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

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

Section - II

Q. 17. 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. 18. 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. 19. $\cosh^{-1} x$ = _____.

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. 20. $cosh^4 A - sinh^4 A$ = _____.

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

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

Q. 21. $(1 + i)^5 =$ _____.

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

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

Q. 22. $\frac{(\cos\theta - i\sin\theta)^5}{(\cos\alpha + i\sin\alpha)^7} =$ _____.

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. 23. $2\cos\frac{C+D}{2}\sin\frac{C-D}{2} =$ _____.

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

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

Q. 24. 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. $\operatorname{cosec} 2\alpha \sinh 2\beta$

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

Q. 25. 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. 26. 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. 27. $\{(\cos\theta + \cos\varphi) + i(\sin\theta + \sin\varphi)\}^n + \{(\cos\theta + \cos\varphi) - i(\sin\theta + \sin\varphi)\}^n =$ _____.

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

Q. 28. 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. 29. 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. 30. 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. 31. 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. 32. $\cos 51° =$ _____.

A. 0.6370 B. 0.6730

C. 0.6037 D. 0.6370

Q. 33. $\coth A(1 + tanh^2 A) - tanh A(1 + coth^2 A) =$ _____.

A. –1 B. 0

C. 1 D. 2

SPACE FOR ROUGH WORK