24MCU415

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2025
(Fourth Semester)

Branch - **MATHEMATICS WITH COMPUTER APPLICATIONS**

SEQUENCE, SERIES AND TRIGONOMETRY

Time: Three Hours | Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	A sequence of real Number is also called____sequence. a) Convergent b) Divergent c) Real d) None	K1	CO1
	2	Let S=$\sum_{n=1}^{\infty}\{S_n\}$ be a sequence of real number , the S has a monotone____. a) Decrease b) Increase c) subsequence d) None	K2	CO1
2	3	Every Cauchy sequence of real numbers ___. a) Divergent b) Convergent c) Bounded d) Sequence	K1	CO2
	4	$\lim_{n\to\infty}\left[1+\frac{1}{n+1}\right]^n =$ a) 0 b) 1 c) e d) ∞	K2	CO2
3	5	The series $\sum_{n=1}^{\infty}\frac{1}{n}$ is _____. a) Divergent b) Convergent c) Bounded d) Sequence	K1	CO3
	6	The series $\sum_{n=1}^{\infty}\frac{(-1)^{n+1}}{n}$ is _____ convergent. a) Absolutely b) conditionally c) increase d) none	K2	CO3
4	7	The expansion of tan nθ in powers of tan θ = a) 1,n b) 0,1 c) 0,n d) 0,2	K1	CO4
	8	Cos θ =_____. a) $1-\frac{\theta^2}{2!}+\frac{\theta^3}{3!}-..$ b) $1-\frac{\theta^2}{2!}+\frac{\theta^4}{4!}-..$ c) $\theta-\frac{\theta^2}{2!}+\frac{\theta^3}{3!}-..$ d) $\theta+\frac{\theta^2}{2!}+\frac{\theta^3}{3!}-..$	K2	CO4
5	9	$tanh^{-1}x=\frac{1}{2}log$ ____. a) $\frac{1+x}{1-x}$ b) $\frac{1-x}{1+x}$ c) x d) $\frac{1}{1-x}$	K1	CO5
	10	Sinh 3x =_____. a) $3sinh^2x-4sinh^2x$ b) $4\,sinh^2x-3\,sinh\,x$ c) $3\,sinh\,x+4sinh^2x$ d) $sinh^2x-1$	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Prove that the sequence $\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n$ is convergent.	K2	CO1
		(OR)		
	11.b.	Prove that $\lim_{n\to\infty}\frac{2n}{n+3}=2$.		
2	12.a.	Prove that $\lim_{n\to\infty}\frac{3n^2-6n}{5n^2+4}=\frac{3}{5}$.	K3	CO2
		(OR)		
	12.b.	Suppose $\lim_{n\to\infty}\{S_n\}$ is convergent sequence of real number. Prove that $\lim_{n\to\infty} sup\, S_n = \lim_{n\to\infty} S_n$.		
3	13.a.	Prove that the series $\sum_{n=1}^{\infty}\left\{\frac{1}{n(n+1)}\right\}$ is converges.	K3	CO3
		(OR)		
	13.b.	State and prove minkowski inequality.		
4	14.a.	Find $\lim_{\theta\to 0}\frac{tan\theta+sec\theta-1}{tan\theta-sec\theta+1}$.	K3	CO4
		(OR)		
	14.b.	Express $cosh^6\theta$ in terms of hyperbolic cosines of multiples of θ.		
5	15.a.	If log sin $(\theta + i\Phi) = L + iB$, then prove that $2e^{2L} = cosh\, 2\Phi - cos\, 2\theta$.	K3	CO5
		(OR)		
	15.b.	Write sum the series up to n terms cosh x + cosh (x+y) + cosh (x+2y) + ... to n terms.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Prove that $\lim_{n\to\infty}\sqrt{n}$ equal to infinity.	K2	CO1
2	17	Prove that any bounded sequence of real number has a convergent subsequence.	K3	CO2
3	18	What values of x does the series $x-\frac{x^2}{3}+\frac{x^5}{5}-\cdots$ converge?	K3	CO3
4	19	Expand $sin^3\theta cos^5\theta$ in a series of sine multiples of θ.	K3	CO4
5	20	State and prove De Moivre's property of the circle.	K3	CO5

Z-Z-Z END