Roll No. _____

END SEMESTER EXAMINATION
SEMESTER- I (New Course)

COURSE CODE : BS 101 | **DURATION : 3 (THREE)HRS**
COURSE TITLE : MATHEMATICS – I | **MAXIMUM MARKS : 60**
SESSION : 'JULY-DEC.' 2021 | **PASS MARKS : 40 %**

NOTE: *1. Attempt any 4 (Four) questions.*
2. Mark for each question is shown against it.
3. Assume suitable logical data wherever necessary.

1.	**(a)**	If $f(x) = secx + e^x$, find $f'(x)$ using first principle of derivatives.	**(5)**
	(b)	If $\alpha_1 = 3 - i$ and $\alpha_2 = 3 + 2i$, find the value of $\left\lvert\frac{\alpha_1 + \alpha_2 + 1}{\alpha_1 - \alpha_2 + 1}\right\rvert$.	**(5)**
	(c)	Decompose the given fraction into partial fractions, $\frac{x^2-2x+1}{(x-1)(x+1)(2x+3)}$	**(5)**
2.	**(a)**	If $y = tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$, find $\frac{dy}{dx}$.	**(5)**
	(b)	Prove that, $cos\left(\frac{2\pi}{3}+\theta\right) + cos\left(\frac{\pi}{3}+\theta\right) = -\sqrt{3}\ \sin\theta$	**(5)**
	(c)	Compute $\lim_{x\to 1} \frac{x^{1/7} - 1}{x^{1/63} - 1}$	**(5)**
3.	**(a)**	Prove that $\frac{sin\,75° - sin\,15°}{cos\,75° + cos\,15°} = \frac{1}{\sqrt{3}}$	**(5)**
	(b)	Convert the given complex number into its polar form, $\frac{1+7i}{(2-i)^2}$.	**(5)**
	(c)	Differentiate $\log\sin(e^x + 5x + 8)$ *w.r.t. x.*	**(5)**
4.	**(a)**	Is -3 a complex number?, If yes, then find its modulus and argument.	**(5)**
	(b)	Prove that $cot(\theta + \varphi) = \frac{cot\theta\ cot\varphi - 1}{cot\varphi\ + cot\theta}$	**(5)**
	(c)	Decompose $\frac{2x+1}{(5x-1)(x^2+1)}$ into partial fraction.	**(5)**
5.	**(a)**	Show that $tan15° + cot15° = 4$.	**(5)**
	(b)	Evaluate $\lim_{\theta\to\frac{\pi}{2}} \frac{(1+cos\,2\theta)}{(\pi-2\theta)^2}$	**(5)**
	(c)	Differentiate $y = x^{tanx} + (sinx)^{cosx}$ *w.r.t. x.*	**(5)**
6.	**(a)**	Find the value of $\lim_{x\to 0} \frac{e^x - e^{-x}}{x}$.	**(5)**
	(b)	Express $\frac{x^2+2x+1}{x^2+x+1}$ in partial fractions.	**(5)**
	(c)	Prove that $\frac{\tan(\frac{\pi}{4}+\beta)}{\tan(\frac{\pi}{4}-\beta)} = \left(\frac{1+tan\beta}{1-tan\beta}\right)^2$	**(5)**

xxxxxxxxxxxxxxxxxx