**K. J. Somaiya College of Engineering, Mumbai-77**
**(A Constituent College Affiliated to Somaiya Vidyavihar University)**
Semester: **September – Jan 2020**
**In-Semester Examination (MOCK)**

**Class:** FY B. Tech
**Branch:** All Branches **Semester:** I
**Full name of the course:** Applied Mathematics-I **Course Code: 116U06C101**
**Duration: 35** min (attempting questions) +20 min (uploading) **Max. Marks:** 14

| Q. No | Questions | Marks |
|---|---|---|
| **Q1** | Choose the correct option from the following MCQ (1 MARK EACH) | 4 marks |
| **1.1** | Find the value of $(1+i)^{100}$<br>(A) $2^{100}(\cos 100\pi + i \sin 100\pi)$ (B) $2^{100}(\cos 25\pi + i \sin 25\pi)$<br>(C) $2^{50}(\cos 100\pi + i \sin 100\pi)$ (D) $2^{50}(\cos 25\pi + i \sin 25\pi)$ | |
| **1.2** | What is the value of $\log(-1)$?<br>(A) $i\pi$ (B) $does\ not\ exist$ (C) $\pi$ (D) 0 | |
| **1.3** | For any square matrix A, which of the following is not correct?<br>A) $(A^{-1})^T = (A^T)^{-1}$ B) $(\bar{A})^{-1} \neq \overline{A^{-1}}$<br>C) $(\bar{A})^{-1} = \overline{A^{-1}}$ D) $(\bar{A})^T = \overline{A^T}$ | |
| **1.4** | What is the rank of $A = \begin{bmatrix} 1 & 2 & -2 & 3 \\ -1 & -3 & 2 & -2 \\ 0 & -1 & 0 & 1 \\ -1 & -4 & 2 & -1 \end{bmatrix}$<br>(A) 4 (B) 1 (C) 2 (D) 3 | |
| **Q2** | Attempt any **ONE** of the following | |
| **(a)** | If $\alpha, \beta$ are the roots of the equation $x^2 - 2\sqrt{3}x + 4 = 0$, Prove that $\alpha^3 + \beta^3 = 0$ and $\alpha^3 - \beta^3 = 16\, i$ | 5 marks |
| **(b)** | Prove that $cosh^7 x = \frac{1}{64}[\cosh 7x + 7\cosh 5x + 21\cosh 3x + 35\cosh x]$ | 5 marks |
| **Q3** | Attempt any **ONE** of the following | |
| **(a)** | Express the following Hermitian matrices as $B + iC$ where $B$ is real symmetric and $C$ is real skew symmetric. | 5 marks |

| | | |
|---|---|---|
| | $\begin{bmatrix} 4 & 3-2i & -1+i \\ 3+2i & 2 & 5+4i \\ -1-i & 5-4i & 7 \end{bmatrix}$<br>Check the condition for $B$ and $C$. | |
| **(b)** | Find the solution of the system given by $\begin{aligned} x_1 - x_2 + x_3 &= 0 \\ x_1 + 2x_2 + x_3 &= 0 \\ 2x_1 + x_2 + 3x_3 &= 0 \end{aligned}$ | 5 marks |