**K. J. Somaiya Institute of Technology, Sion, Mumbai-22**
**(Autonomous College Affiliated to University of Mumbai)**

Nov – Dec 2025
(B. Tech / M. Tech.) Program: Artificial Intelligence and Data Science Scheme :IIB
Regular/Supplementary Examination: SY Semester: III
Course Code: AIC304 and Course Name: Digital Logic and Computer Architecture
Date of Exam: 02/12/2025 Duration: 02.5 Hours Max. Marks: 60

Instructions:
(1)All questions are compulsory.
(2)Draw neat diagrams wherever applicable.
(3)Assume suitable data, if necessary.

| Q. No. | Question | Max. Marks | CO | BT level |
|---|---|---|---|---|
| Q 1 | Solve any **two** questions out of three: (05 marks each) | 10 | | |
| a) | Write short note on "Number system and its types" | | CO1 | U |
| b) | Perform Binary Subtraction addition **i)** $(246)_{10} - (116)_{10}$ **ii)** $(15)_{10} - (12)_{10}$ | | CO2 | Ap |
| c) | Draw Half adder using logic gates and its truth table. | | CO3 | U |
| Q.2 | Solve any **two** questions out of three. (10 marks each) | 10 | | |
| a) | Write a short note on IEEE-754 single-precision and double precision format. | | C03 | U |
| b) | Write short note on "Memory Hierarchy" | | CO5 | U |
| c) | What is Microprogramming? Explain the structure of a Microinstruction with a neat diagram. | | CO4 | U |
| Q.3 | Solve any **two** questions out of three. (10 marks each) | 20 | | |
| a) | Perform conversion given decimal numbers into BCD, gray code and XS-3 code. **i)** $(255)_{10}$ **ii)** $(345)_{10}$ | | CO1 | U |
| b) | Using Non restoration division algorithm performs division of a given number. $(8)_{10}$ **X** $(3)_{10}$ | | CO2 | Ap |
| c) | Draw and explain Instruction cycle state diagram with and without interrupt handling. | | CO3 | U |
| Q.4 | Solve any **two** questions out of three. (10 marks each) | 20 | | |
| a) | What is a Control unit? Explain Wilkes microprogrammed control unit with suitable diagram | | CO4 | U |

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|---|---|---|---|
| b) | List types of cache memory mapping techniques and explain any one in detail with a suitable diagram. | CO5 | U |
| c) | What are hazards in a pipelined processor? Explain different types of hazards with suitable examples. | CO6 | U |

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