Anjuman Islam Janjira Degree College of Science Murud-Janjira, Raigad-402401 Affiliated to University of Mumbai	
Class: -F.Y.B.Sc. C.S.	**Subject: - Digital Systems and Architecture**
Semester:- I	**Course code: -USCS101**
Exam Event:- Additional Exam Summer 2024 (FH)	**Marks: -75**
Date: - 20/03/2024	**Duration: - 02:30 Hours**

N.B. – 1 – All questions are compulsory.
2 – All questions have internal choice.
3 – Figures to the right indicate full marks.

Q1. Answer the following question. (Any 4 out of 6) **20**

1) Define flip-flops and provide a brief explanation of the D flip-flop.
2) Explain what a universal gate is and demonstrate how to construct a NOR gate and a NOT gate using only NAND gates.
3) Elaborate on the distinctions between synchronous and asynchronous counters.
4) Define a counter and provide a comprehensive explanation of its various types.
5) Highlight the differences between computer organization and computer architecture.
6) Provide an in-depth explanation of a multiplexer.

Q2. Answer the following question. (Any 4 out of 6) **20**

1) Elaborate on the concept of memory hierarchy.
2) What are application of microprogramming?
3) Highlight the distinctions between SRAM and DRAM.
4) Describe the immediate, direct, and indirect addressing modes.
5) Provide a concise explanation of replacement algorithms. Determine the hit and miss for the given string using the FIFO method: 1 3 2 4 2 1 5 1 3 2 6 7 5 4 3 2 4 2 3 1 4 (Assuming a page frame size of 3).
6) Define interleaved and associative memory.

Q3. Answer the following question. (Any 4 out of 6) **20**

1) Elaborate on the distinctions between hardwired and microprogrammed control units.
2) Provide a comprehensive explanation of cluster computing, including its advantages and disadvantages.
3) Distinguish between i3, i5, and i7 processors.
4) Explain Linear, Ring, and Star network topologies.
5) Discuss the various tiers or levels of parallel processing.
6) Elaborate on Flynn's classification of parallel computing.

Q4. Answer the following question. (Any 5 out of 6) **15**

1) Explain the SR flip-flop.
2) Draw the combinational circuit using basic gates to achieve the following outputs:
   i) $Y=AB+BC+\overline{A}\,\overline{B}$ ii) $Y=A\overline{B}+\overline{A}B$
1) Discuss mesh topology briefly.
2) Give a note on best fit, worst fit and next fit.
3) Explain Flash memory.
4) Distinguish between single-stage and multi-stage networks.