7. (a) What are directory-based protocols for network-connected multiprocessors ? How are these different from snoopy protocols ? Where and why are these used ? Illustrate their relevance. 9

(b) What do you mean by deadlocks in message-passing networks ? What are the ways to overcome deadlocks ? Illustrate. 7

UNIT – IV

8. (a) What are quantum computers ? What is their working principle ? How are these different from classical computers ? How are these significant in this modern age ? Illustrate. 10

(b) What are the postulates of quantum mechanics ? How are these relevant ? Explain. 6

9. Explain the following :

(a) Quantum cryptography and its significance 8

(b) Grover's quantum search algorithm 8

Roll No. .....

67064-N

MCA 2nd Semester 2 yr. Course
(w. e. f. 2020-21)

Examination – July, 2022

ADVANCE COMPUTER ARCHITECTURE & QUANTUM COMPUTING

Paper : 20MCA22DB3

Time : Three hours] *[Maximum Marks : 80*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all. Question Number 1 is *compulsory*. In addition to *compulsory* question, student has to attempt *four* more questions selecting *one* question from each Unit. All questions carry equal marks.

1. (a) What are parallel computers ? Enumerate their classification.

(b) Differentiate between hardware and software parallelism.

P. T. O.

(c) What are snoopy protocols ? What is their importance ?

(d) What are multicasting algorithms ? Outline their significance.

(e) How does NUMA model differ from COMA model ?

(f) What is a crossbar switch ? How does it work ?

(g) What are systolic arrays ? Discuss their significance.

(h) What is Omega Network ? $2 \times 8 = 16$

UNIT – I

2. (a) What do you mean by program flow mechanisms ? How do you compare control-flow, dataflow and reduction computers in terms of program flow mechanisms ? Illustrate. 8

(b) What is the effective CPI of a computer which uses a 25 MHz processor with a claimed 5 MIPS rating to execute a given program mix. Assume a one-cycle delay for each memory access. 8

3. (a) What are Bernstein's conditions ? Illustrate their relevance. 6

(b) What is CPU performance ? How instruction set, compiler technology, CPU implementation and control, cache and memory hierarchy affect the CPU performance ? Illustrate. 10

UNIT – II

4. (a) What are dynamic connection networks ? What are its important types ? Illustrate the significance and suitability of each type. 8

(b) What are binary fat trees ? Illustrate the advantages of using binary fat trees over conventional binary trees as a multiprocessor interconnection network. 8

5. What is meant by memory hierarchy ? Explain the inclusion property and memory coherence requirements in a multilevel memory hierarchy ? Also differentiate between write-through and write-back policies in maintaining the coherence in adjacent levels. 16

UNIT – III

6. (a) What are virtual channels ? Where and how are these useful ? Discuss. 7

(b) What are multi-computers ? What is the generic model of a multi-computer ? Which interconnection schemes are used for these ? Illustrate. 9