OBE

REFNO048587

B.Sc. (Hons.) Semester IV Examination 2021-22

Computer Science

CS-104 : Computer Organization and Architecture

Time : 4:30 hours **Max. Marks : 70**

Instructions

1. The Question Paper contains **08** questions out of which you are required to answer any **04** questions. The question paper is of **70 marks** with each question carrying **17.5 marks.**

   प्रश्नपत्र में 08 प्रश्न पूँछे गये हैं जिनमें से 04 प्रश्नों का उत्तर देना है। प्रश्नपत्र 70 अंकों का है, जिसमें प्रत्येक प्रश्न 17.5 अंक का है।

2. The total duration of the examination will be **4.30 hours** (Four hours and Thirty Minutes) which includes the time for downloading the question paper from the Portal, writing the answers by hand and uploading the hand-written answer sheets on the portal.

   परीक्षा का कुल समय 4.30 घंटे का है जिसमें प्रश्नपत्र को पोर्टल से डाउनलोड करके पुनः हस्तलिखित प्रश्नों का उत्तर पोर्टल पर अपलोड करना है।

3. For the students with benchmark disability as per Persons with Disability Act, the total duration of examination shall be **6 hours** (six hours) to complete the examination process, which includes the time for downloading the question paper from the Portal, writing the answers by hand and uploading the hand-written answer sheets on the portal.

   दिव्यांग छात्रों के लिये परीक्षा का समय 6 घंटे निर्धारित हैं जिसमें प्रश्नपत्र को पोर्टल से डाउनलोड करना एवं हस्तलिखित उत्तर को पोर्टल पर अपलोड करना है।

4. Answers should be hand-written on a plain white A4 size paper using black or blue pen. Each question can be answered in upto 350 words on 3 (Three) plain A4 size paper (only one side is to be used).

   हस्तलिखित प्रश्नों का उत्तर सादे सफेद A4 साइज के पन्ने पर काले अथवा नीले कलम से लिखा होना चाहिये। प्रत्येक प्रश्न का उत्तर 350 शब्दों तक तीन सादे पृष्ठ A4 साइज में होना चाहिये। प्रश्नों के उत्तर के लिए केवल एक तरफ के पृष्ठ का ही उपयोग किया जाना चाहिए।

5. Answers to each question should start from a fresh page. All pages are required to be numbered. You should write your Course Name, Semester, Examination Roll Number, Paper Code, Paper title, Date and Time of Examination on the first sheet used for answers.

   प्रत्येक प्रश्न का उत्तर नये पृष्ठ से शुरू करना है। सभी पृष्ठों को पृष्ठांकित करना है। छात्र को प्रथम पृष्ठ पर प्रश्नपत्र का विषय, सेमेस्टर, परीक्षा अनुक्रमांक, प्रश्नपत्र कोड, प्रश्नपत्र का शीर्षक, दिनांक एवं समय लिखना है।

Questions

P.T.O.

1.	(a)	Draw a diagram of a bus system for 8 registers of 5 bits each using three state buffer.	9
	(b)	Design a 4-bit adder-subtractor and explain its working	8.5
2.	(a)	What is addressing mode and why do we need addressing modes?	7.5
	(b)	An instruction is stored in a location 900 with its address field at location 901. The address field has the value 1000. A processor register R1 contains the number 1200. Evaluate the effective address if the addressing mode of the instruction is (i) Direct, (ii) Immediate, (iii)Relative, (iv)Register indirect	10
3.		Explain working of DMA and various modes of DMA operations with suitable diagram.	17.5
4.	(a)	What is memory hierarchy and why do we need it? Explain.	7.5
	(b)	Consider a logical address space of 16 pages of 1024 words each, mapped on to a physical memory of 32 frames. How many bits are there in the logical address? How many bits are there in the physical address?	5
	(c)	A computer has 32-bit instructions and 10-bit addresses. If there are 85 two-address instructions, how many one address instructions can be formulated?	5
5.	(a)	What are the various status bit conditions stored in status register. How do they help in conditional branch instructions? Explain with suitable examples.	9
	(b)	Explain shift microoperations with suitable block diagrams and examples. Also mention how to detect overflow condition in the arithmetic shift microoperation.	8.5
6.	(a)	Why I/O interface is required? Give any three reasons.	8.5
	(b)	Differentiate between Horizontal and Vertical Microinstruction format for microprogrammed control unit.	9
7.	(a)	Write the difference between Static RAM and Dynamic RAM.	4
	(b)	What is Strobe control and handshaking? Explain in brief.	3.5
	(c)	A 4-way set-associative cache memory unit with a capacity of 32 KB is built using a block size of 8 words. The word length is 16 bits. The size of the physical address space is 4 GB. Find the number of bits required for the TAG field.	10
8.		Explain followings in detail: (i) Isolated Vs Memory mapped I/O, (ii) Boothstrap Loader, (iii) Stored Program Concept, (iv) Difference between a branch instruction, a call sub-routine instruction and a program interrupt.	17.5