OBE

REFNO039053

B.Sc. (Hons.) IV Semester Examination 2020-21

Computer Science

CS-105: Computer Organization and Architecture

Time: Four hours **Full 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 आठ प्रश्न पूँछे गये हैं जिनमें से 4 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 hours** (Four hours), 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 घंटे का है जिसमें प्रश्नपत्र को पोर्टल से डाउनलोड करना, 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 है 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 एक सादे सफेद A4 साइज के पन्ने पर काले अथवा नीले कलम से लिखा होना चाहिये। प्रत्येक प्रश्न का उत्तर 350 शब्दों अथवा A4 साइज के तीन पृष्ठों का होना चाहिये। प्रश्नों का उत्तर कापी के केवल एक पृष्ठ पर ही लिखना है।

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

1. **(a)** Draw a diagram of a bus system for 6 registers of 8 bits each using multiplexer. 9

P.T.O.

	(b)	What is the difference between logical, circular and arithmetic shift? Starting from an initial value of R = 11000101, determine the sequence of binary values in R after a logical shift-left, followed by a circular shift-right, followed by a logical shift-right and circular shift-left. Give the decimal equivalent of the final value of R.	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 450 with its address field at location 451. The address field has the value 800. A processor register R1 contains the number 900. Evaluate the effective address if the addressing mode of the instruction is (i) Direct (ii) Immediate (iii)Relative (iv)Register indirect.	10
3.		Explain followings in detail: (i) Bootstrap Loader, (ii) Stored Program Concept, (iii) Difference between a branch instruction, a call sub-routine instruction and a program interrupt.	17.5
4.	**(a)**	What is memory hierarchy and why do we need it? Explain.	9
	(b)	Consider a computer system with 16GB virtual memory. Size of each entry in the page table is 4B. Find the minimum possible page size that stores entire page table.	8.5
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)	The memory unit of a computer has 256K words of 64 bits each. The computer has an instruction format with four fields: an operation code field, a mode field to specify one of thirteen addressing modes, a register address field to specify one of 80 processor registers, and a memory address. Specify the instruction format and the number of bits in each field if the instruction is in one memory word.	8.5
6.	**(a)**	Why I/O interface is required? Give any three reasons.	8.5
	(b)	Explain various modes to handle data transfer between computer and I/O devices.	9
7.	**(a)**	What is cache memory? Explain various cache mapping techniques with suitable examples.	9
	(b)	A computer system has physical memory of size 4Giga words. Direct-mapped	8.5

P.T.O.

cache memory can store 256 blocks. A block can store 16 words. You have to find the line number in cache memory where each of the following addresses can be mapped: (i) 2D345C12 (ii) F45F40F5 (iii) 12565348

8. Write short notes on: (i) Register Transfer Language, (ii) Serial Communication, (iii) Strobe Control, (iv) handshaking. 17.5

— o —