

2019

COMPUTER SCIENCE

PAPER-II

Time Allowed — 3 Hours

Full Marks — 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

The figures in the margin indicate full marks for each question.

Answer any five questions.

1. (a) State the major activities of an operating system in regard to process management. 5
- (b) What is the main advantage of the layered approach to system design? 5
- (c) Describe the differences among short-term, medium-term and long-term scheduling. 5
- (d) Suppose that the following processes arrive for execution at the times indicated. Each process will run the listed amount of time. In answering the questions, use non-preemptive scheduling and base all decisions on the information you have at the time the decision must be made.

Process	Arrival Time	Burst Time
$P_1$	0.0	8
$P_2$	0.4	4
$P_3$	1.0	1

- (i) What is the average turnaround time for these processes with the FCFS scheduling algorithm?
- (ii) What is the average turnaround time for these processes with the SJF scheduling algorithm? 6+6=12
- (e) Explain the concept of demand paging. 5
- (f) When do page faults occur? Describe the actions taken by the operating system when a page fault occurs. 3+5=8
2. (a) Differentiate between class and structure. With an example, explain the syntax for defining a class. 2+3=5
- (b) Explain the visibility of base class members for the access specifiers: private, protected and public while creating the derived class and also explain the syntax for creating derived class. 8

Please Turn Over



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(2)

- (c) List the characteristics of a constructor. Write a C++ program to define a suitable parameterized constructor with default values for the class distance with data members feet and inches.  
3+7=10
- (d) Define exception handling. Explain the use of try, catch and throw for exception handling in C++.  
4+6=10
- (e) Differentiate between early binding and late binding. Explain how late binding can be achieved in C++.  
3+4=7
3. (a) Explain the different factors affecting the processing speed of CPU. 5
- (b) A digital computer has a memory unit with 24 bits per word. The instruction set consists of 150 different operations. All instructions have an operation code part (opcode) and an address part (allowing for only one address). Each instruction is stored in one word of memory.
- How many bits are needed for the opcode?
  - How many bits are left for the address part of the instruction?
  - What is the maximum allowable size for memory?
  - What is the largest unsigned binary number that can be accommodated in one word of memory? 8
- (c) What is the average access time of a system having three levels of memory hierarchy: a cache memory, a semiconductor main memory and magnetic disk secondary memory. The access times of these memories are 20 ns, 200 ns and 2 ms respectively. The cache hit ratio is 80 per cent and the main memory hit ratio is 99 per cent. 5
- (d) Suppose that a bus has 16 data lines and requires 4 cycles of 250 nsecs each to transfer data. The bandwidth of this bus would be 2 Megabytes/sec. If the cycle time of the bus was reduced to 125 nsecs and the number of cycles required for transfer stayed the same, what would be the bandwidth of the bus? 5
- (e) Explain the advantages of pipelined processing. State the various hazards that can happen in a pipeline with suitable examples. 3+9=12
- (f) Discuss on the key features of Shared-Memory Multiprocessor Architecture. 5
4. (a) Differentiate between bit-rate and baud rate. List three main functions of data link layer. 2+3=5
- (b) Show the NRZ and NRZI encoding for bit pattern given below: 5  
1001 1111 0001 0001
- (c) Why does error occur in a computer network? Explain the general principle of error detection. Briefly describe the method of Cyclic-Redundancy Check (CRC) for error checking. 2+3+6=11
- (d) Explain how a message exchange takes place between two machines A and B using TCP connection. 6



- (e) Explain the key principles of
- (i) Circuit Switching
  - (ii) Packet Switching
- 4+4=8
- (f) A host in a organization has an IP address 150.32.64.34 and subnet mask 255.255.240.0, what is the address of this subnet? What is the range of IP addresses that a host can have on this subnet?
- 2+3=5
5. (a) Discuss the following terms:
- 10
- (i) Candidate key
  - (ii) Primary key
  - (iii) Super key
  - (iv) Composite key
- (b) What is the difference between Strong and Weak entity? What do you mean by terms Aggregation and Generalization? Explain them with the help of example.
- 4+6=10
- (c) What do you mean by Normalization? Explain BCNF, 3NF and 2NF with a suitable example.
- 10
- (d) Write SQL queries for the given database:
- Employee (eid, emp-name, street, city)
- Works(eid, cid, salary)
- Company(cid, comp-name, city)
- Manager(eid, manager-name)
- (i) Find the names of all the employees having 'S' as first letter in their names.
  - (ii) Display the annual salary of all the employees.
  - (iii) Find the name, street and city of all employees who work for "Accenture" and earn more than 30,000.
  - (iv) Give total number of employees.
- 10
6. (a) Explain the necessity of a Program Counter, Stack Pointer and Status Flags in the architecture of 8085 microprocessor.
- 10
- (b) Explain the direct addressing modes and indirect addressing modes of 8085 with example.
- 4
- (c) Write a program to perform the following functions and verify the output steps:
- 8
- (i) Load the number 5CH in register D.
  - (ii) Load the number 9E H in register C.
  - (iii) Increment the Contents of register C by one.
  - (iv) Add the contents of register C and D and Display the sum at output port 1.



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(4)

- (d) Write an assembly language program to find out the largest number from a given array of 8 bit numbers. The numbers are stored sequentially from a known address. 6
- (e) Explain the difference between a JMP instruction and CALL instruction. What is meant by interrupt? Explain the signals HOLD, READY and SID in connection with 8085 microprocessor.  $3+3+(2+2+2)=12$
7. (a) With reference to Assembler, explain following tables with suitable example: 10
- (i) POT
  - (ii) MOT
  - (iii) ST
  - (iv) LT
- (b) What is Parsing? Explain any one parsing technique. 5
- (c) Explain the role of code optimization in compiler designing? Explain Peep-hole optimization along with an example.  $5+5=10$
- (d) State the different functions of loader. 5
- (e) Explain Design of Dynamic Linking Loader along with example. 10
8. (a) Explain in detail the Cohen-Sutherland line clipping algorithm with an example. 10
- (b) Explain two dimensional translation and scaling with a 2D object. 6
- (c) Briefly explain RGB and YIQ color models in detail. 8
- (d) Explain the terms  $3+3=6$
- (i) Motion tweening
  - (ii) Morphing
- (e) Discuss on the key operations performed in JPEG compression. 10

**For guidance of WBCS Prelims , Main Exam and Interview by WBCS Gr A Officers/ Toppers, WBCS Prelims and Main Mock Test (Classroom & Online), Optional Subjects, Studymaterials, Correspondence Course etc.Call WBCSMadeEasy™ at 9674493673 or mail us at [mailus@wbcsmadeeasy.in](mailto:mailus@wbcsmadeeasy.in)Type your text**