BMW(O)-CS-II/21

2021

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.*

*Answers may be given either in **English** or in **Bengali**
but all answers must be in one and same language.*

Answer *any five* questions.

1. (a) An identifier is defined as a sequence of letters and digits starting with a letter. Draw transition diagram for the identifier.   10

   (b) Define FIRST and FOLLOW sets. State the rules for computing them.

   Consider the grammar—

   $E \rightarrow TE'$

   $E' \rightarrow + TE' / \epsilon$

   $T \rightarrow FT'$

   $T' \rightarrow *FT' / \epsilon$

   $F \rightarrow (E) / id$

   where grammar symbols are conventional.

   Obtain the FIRST and FOLLOW sets.   5+5+10+10=30

2. (a) Draw a flowchart to describe working of Pass-I of a two-pass assembler. Describe the data structures used.   15+10=25

   (b) What do you mean by coupling and cohesion in a modular system? How are they related to good design?   8+7=15

3. (a) What is meant by a friend class? Give an example.   5+5=10

   (b) Distinguish between private and public access specifiers with examples.   10

   (c) What is a constructor? State the rules for creating a constructor in C++. What is default constructor?   6+10+4=20

4. (a) Describe different addressing modes of Intel 8085.   15

   (b) Explain the following: 10

   (i) MVI (ii) SHLD (iii) DAA (iv) RLC (v) PCHL

   (c) Write an Intel 8085 assembly language program to accomplish the following: 15

   Add the two 8-bit numbers 98H and 9AH in the memory location in 2501H and 2502H respectively and store the results in 2503H and 2504H. 2503H contains LSBs of sum and 2504H contains MSBs of sum.
   Explain the working.

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Please Turn Over

5. (a) Design an E–R diagram for airline reservation system consisting of flights, aircrafts, airports, fares, reservations, tickets, pilots, crew and passengers. Clearly highlight the entities, the relationship, the primary keys and the mapping constraints. 　　20

   (b) Consider the following database schema:

   SUPPLIER (Sid, Sname, Saddress)

   CUSTOMER (Cid, Cname, Cadd, Cbalance)

   ITEM (Ino, Iname, Icolour, Iprice)

   ORDER (Sid, Cid, Ino, Qty, Qno)

   Answer the following SQL queries: 　　12

   (i) List names of all suppliers who have supplied at least one red item or at least one green item.

   (ii) List the supplier-id, name of all suppliers, who have supplied all items ordered by 'ANIL'.

   (c) Explain 3NF, 2NF with suitable example. 　　8

6. (a) Explain simple paging and simple segmentation. What are the advantages of segmentation over paging? 　　5+5=10

   (b) Give a formal definition of Deadlock. Mention the form necessary conditions for a deadlock to occur. Distinguish between Starvation and Deadlock. 　　5+8+7=20

   (c) Assume a fixed frame allocation for a process of three frames. The execution of the process requires reference to five distinct pages. The page address stream formed is

   $$2\ 3\ 2\ 1\ 5\ 2\ 4\ 5\ 3\ 2\ 5\ 2$$

   Determine the number of page faults for the following page replacement algorithms. Explain your answer.

   (i) Optimal policy　　(ii)　LRU　　(iii)　FIFO 　　10

7. (a) What is Cache coherence? Explain the coherence protocol. 　　5+10=15

   (b) The access time of Cache memory is 50 ns. and that of the main memory is 500 ns. It is estimated that 80% of the main memory requests are for read and the remaining are for write. The hit ratio for read access only is 0.9 and a write-through policy is used.

   (i) Determine the average access time considering only the read cycle.

   (ii) What is the average time if the write requests are also taken into consideration? 　　10

   (c) Describe the OSI network architecture proposed by ISO. Discuss briefly the functions of each layer. 　　15

8. Write short notes on (any four) : 　　10×4=40

   (a) Process control block

   (b) Spooling

   (c) Remote procedure call

   (d) Demand paging

   (e) Bresenham's line drawing algorithm

   (f) Interrupts