FEDERAL PUBLIC SERVICE COMMISSION

COMPETITIVE EXAMINATION FOR RECRUITMENT TO POSTS IN BPS-17 UNDER THE FEDERAL GOVERNMENT, 2001.

COMPUTER SCIENCE

TIME ALLOWED: THREE HOURS   MAXIMUM MARKS: 100

NOTE:1. Attempt **FIVE** questions in all, including question **No.8** which is **COMPULSORY**. Select at least **ONE** question from **EACH** of the SECTIONS A, B and C. All questions carry **EQUAL** marks.

2. Illustrate your answers with diagrams and sketches where necessary.

3. Answers should be to the point. Avoid unnecessary details but record facts and any assumptions made.

SECTION - A

1. (a) Draw the block diagram of a digital computer. Describe the functions of its various parts.

    (b) What is a Computer Bus? Name and briefly explain the functions of important Computer Buses.

2. (a) What does Network protocols mean? Name Two main categories of network protocols. Explain and give examples of each.

    (b) What is the OSI model? How many layers does it consist of? Name these layers along with their brief functionality.

3. (a) What are the five major activities of an operating system in regard to process management?

    (b) Briefly describe the three major activities of an operating system in regard to secondary storage management.

SECTION - B

4. (a) Write down the syntax and flow chart of if/else operation. Also explain its function. **(6)**

    (b) What is the output of the following code? **(6)**
    ```
    int x = 5;
    int y = 10;
    cout << "x =" <<++x<< '\n';
    cout << "x =" <<--x << '\n';
    cout << "y =" << ( y = ++x - 2 ) << '\n';
    cout << "y =" <<  y ++ << '\n';
    ```

    (c) Consider the following program segment:
    ```
    cout << "Enter the value for x";
    cin >> x;
    cout << "Enter the value for y";
    cin >> y;
    if x>0
    {
    if y>0
     --y;
    }
    else
    ++ x;
    ```

(i)   Are there any Syntax errors in the code? If so where are they?

(ii)   Assuming any Syntax errors corrected, when will y be decremented?

(iii) Assuming any Syntax errors corrected, when will x be incremented?

5:    (a)   Name the models that can be used in Software engineering. Explain any one model in detail. **(10)**

       (b)   Differentiate between a Stack and a Queue. How are these handled in C++ ? Describe various situations where stacks are preferred over queues. **(10)**

SECTION – C

6.   What is normalization? Briefly explain 1st , 2nd and 3rd normal forms using any Database example. **(20)**

7.   (a)   Define the term "Computer Animation". Briefly explain the design of animation sequences. **(10)**

       (b)   What is clipping? Why is it used in computer graphics? Name 5 primitive types of clipping. Briefly explain any two types. **(10)**

COMPULSORY QUESTION

8.   (A)   Write only True or False in the Answer Book. Do not reproduce the questions. **(1 × 10)**

       (1)   Detecting and recovering errors in data communication is called flow control.

       (2)   Shareware software are used to share data between two computers.

       (3)   Computer programs that are used to detect and remove viruses from the computer system are called anti-virus programs.

       (4)   The preprocessor directive "include" is used to define a constant quantity.

       (5)   Incremental backup means the entire backup of the data from the hard disk of the computer.

       (6)   Wide Area Networks are limited to one office building.

       (7)   Secondary storage is another name for RAM.

       (8)   LPT2 represents the second parallel port.

       (9)   A Spool Folder is a temporary storage area for print jobs.

       (10) A Webmaster is a person who maintains the website of an organization.

       (B)   Give short answers to the following questions **(1 × 10)**

       (11) What is Fast Ethernet?

       (12) How do you add a workstation to the domain?

       (13) What is the draw back of Array implementation of Collection?

       (14) Briefly write the procedure for Binary Search.

       (15) Conceptually what happens in a DBMS?

       (16) Briefly describe ROM – BIOS.

       (17) How do you define PORTS? Name different types of ports.

       (18) What is Password? Where and how will you use it?

       (19) How do viruses infect PCs?

       (20) Briefly describe Data Transmission Modes.

COMPETITIVE EXAMINATION FOR RECRUITMENT TO POSTS
IN PBS-17, UNDER THE FEDERAL GOVERNMENT, 2002

COMPUTER SCIENCE

__TIME ALLOWED: THREE HOURS__   __MAXIMUM MARKS: 100__

NOTE: 1)   Attempt **FIVE** questions in all, including **QUESTION NO. 8** which is
                   COMPULSORY. Select at least **ONE** question from each of the
                   SECTIONS A, B and C. All questions carry **EQUAL** marks.
              2)   Illustrate your answers with diagrams and sketches wherever necessary.
              3)   Answers should be neat, clean and to the point. Avoid unnecessary
                   details but record facts and any assumptions made.

SECTION – A

1. (a)   Differentiate between CISC and RISC computer architectures and in this
          context, describe the architecture of a Stack Machine?   (10)
    (b)   Define a process and process control block. Draw a 5-state model for the
          process state transition and explain it?   (10)

2. (a)   Define a parallel computer and describe the Flynn's Taxonomy to characterize
          the various parallel computer architectures?   (10)
    (b)   Differentiate between the paging and segmentation? And describe the
          working of Page-Fault Frequency Algorithm?   (10)

3. (a)   Describe the TCP/IP and explain the concept of TCP/IP ports. Also describe
          the functionality of at least two well-known protocol ports.   (10)
    (b)   What is the OSI model? Name various OSI layers and briefly describe their
          functionality.   (10)

SECTION – B

4. (a)   Write an algorithm to construct the binary tree with given preorder
          and inorder sequence? Prove that every binary tree is uniquely defined by its
          preorder and inorder sequence?   (10)
    (b)   Provide five examples of software development projects that would be
          amenable to prototyping, name two or three applications that would be more
          difficult to prototype?   (10)

5. (a)   Briefly construct various Software Development Life Cycle models and their
          effectiveness in appropriate situations.   (10)
    (b)   Write notes on: (10)

          i.   Parameter Passing in C++
          ii.   C++ operator associations and order of precedence
          iii. C++ structures and classes.

SECTION – C

6. (a)   Describe the Besenham's Line algorithm for raster devices and implement it in
          C++   (10)
    (b)   Differentiate between DDL, DML, DCL and give examples.   (10)

7. (a)   Consider the following relations and identify the highest normal form of each,
          as given, stating any assumption that you need to make.   (10)

          1) WORK1 (EMPID, EMPNAME, DATE_HIRED, JOB_TITLE,
              JOB_LEVEL)
          2) WORK2   (EMPID,   EMPNAME,JOB_
              TITLE,RATING_DATE, RATER_NAME, RATING)

3) WORK3 (EMPID, EMPNAME, PROJECT#,PROJECT_NAME, PROJ_BUDGET, EMP_MANAGER, HOURS_ASSIGNED)

4) WORK4 (EMPID, EMPNAME, SCHOOL_ATTEND, DEGREE, GRADUATION_DATE)

5) WORK5 (EMPID, EMPNAME, SOCIAL_SECURITY_NUMBER, DEPENDENT_NAME, DEPENDENT_ADDRESS, RELATION_TO_EMP)

(b) What are scripting languages? Display the user name and password of the user using Perl on the same page, using both Get and Post form? **(10)**

COMPULSORY QUESTION

8. (A) Write only True or False in the Answer Book. Do not reproduce the question · **(1x10)**

1. The terms "type cast" and "type conversion" have different semantics i.e. they have different effects on the program execution.

2. Alignment restrictions of modern RISC-architectures force compilers to occasionally introduce "holes" and "padding" for record structures to ensure efficient access of record elements.

3. In a language with garbage collection, the programmer need not worry about heap memory management.

4. In order to execute a program by interpretive execution, the interpreter needs to execute on the system on which the program is to be run.

5. A GUI is a Graphical Utility Interface.

6. The study of algorithms began in the 1900's when electronic computers began to be used.

7. A bus is a part of the computer that decides if a value should be stored as an integer or floating point.

8. Peripheral devices handle the coordination of a computer's activities.

9. Get method in HTML forms is used for debugging.

10. "pine" is an example of e-mail utility.

(B) Please choose the most appropriate answer from the given set of answers. **(1 X 5)**

11. State Transition Diagram gives information of
   a. Prototype Model   b. RAD Model
   c. Spiral Model   d. None of these.

12. The concept of meaning represented by an algorithm is known as its:
   a. Control structure   b. Sequence
   c. Semantics   d. Syntax

13. Each cell of memory is numbered and that number is referred to as the cell's
   a. Block   b. Identity
   c. Address   d. Size

14. Main memory is called RAM because
   a. It is volatile, like a ram's temper
   b. The computer starts at address 0 and reads every byte until it reaches the correct address.
   c. It can Read All Memory
   d. The memory is accessible randomly

15. To use internet, the computer must have
   a. Telephone   b. Modem
   c. ISP Connection   d. All of the above

(C) Give short answers to the following questions: **(1 x 5)**

16. Functions of an O.S.
17. Object Oriented Programming
18. Normalization & BCNF
19. Graphs & Trees
20. Server Side Scripting Languages

****

47

FEDERAL PUBLIC SERVICE COMMISSION

COMPETITIVE EXAMINATION FOR RECRUITMENT TO POSTS IN PBS-17, UNDER THE FEDERAL GOVERNMENT, 2003

'COMPUTER SCIENCE

TIME ALLOWED: THREE HOURS   **MAXIMUM MARKS: 100**

NOTE: Attempt **FIVE** questions in all, including **QUESTION NO. 8** which is **COMPULSORY**. Select at least **ONE** question from each of the **SECTIONS – I, II** and **III**. All questions carry **EQUAL** marks. Illustrate your answer with diagrams and sketches wherever necessary. Answer should be neat, clean and to the point. Avoid unnecessary details but record facts and any assumptions made.

SECTION - I

1.   (a)   What is the BIOS and what functions are preformed by it?   **(10)**

     (b)   What is Virtual Memory and how many ways it is implemented? In this context describe some three process scheduling techniques?   **(10)**

2.   (a)   What do you mean by a linear system? Give an example of it. Explain how Gaussian elimination algorithm can be used to solve a linear system of equations? Why this algorithm is suitable for parallelization?   **(10)**

     (b)   Explain various addressing modes of instructions with examples. What is the process control Block and what are its functions.   **(10)**

3.   (a)   What factors would you consider if you are asked to design a LAN from scratch? Assume that all Hardware requirements can be satisfied appropriately.   **(10)**

     (b)   What is the basic difference between a Switch and a Hub? State which device controls the collision domains betterly.   **(10)**

SECTION -II

4.   (a)   How the complexity of an algorithm is measured? Define and explain Greedy Algorithms.   **(10)**

     (b)   Discuss various types of team structure that can be formed for software development. Also explain briefly why the feasibility of producing quality software is reduced if project risk is great.   **(10)**

5.   (a)   Provide three examples of fourth generation Software Engineering technique. Explain COCOMO model for software estimation. Discuss your perception of ideal training and background for a system analyst.   **(10)**

     (b)   Differentiate between the parameter passing paradigm "calls by value" and "call by reference". Also find out the result of the following expressions. Execute each expression independently.
$$\text{int } a = 40, b = -8, c = 2, p = 9, q = 4, r = 12, x = 5, y = 10$$
       a.   X += !(!x) + !!y*c
       b.   X=(a%b>? (a%c>0? 3:4): (b>c?5:6))
       c.   P-=q++ % --q+r
       d.   X = p++ * --q +++ r   **(10)**

COMPUTER SCIENCE

6.   (a)   Describe various 2D-taransformations and represent them in normal form. **(10)**

         (b)   Explain the concept of ODBC, with the help of an architectural diagram. What problems are caused by data redundancies? Can data redundancies be completely eliminated when the database approach is used? Why or why not? **(10)**

7.   (a)   Define 3NF, BCNF. Give an example of a relation in 3NF but not in BCNF. Transform that relation in BCNF. What are checkpoints? Where they are used? Why? **(10)**

         (b)   With the help of appropriate diagram explain the CGI programming environment in detail. Write a CGI based Perl script that keeps track of the number of visitors to the home page of a certain site. **(10)**

COMPULSORY QUESTION

8.   (A)   Write only True or False in the Answer Book. Do not reproduce the question **(1x10)**

           (1)   A feature of an operating system that allows more than one program to run simultaneously is called Multitasking.

           (2)   A trackball operates like a joystick on its back. It is extremely useful when there isn't enough space to use a mouse.

           (3)   Digitizing Tablet is a special Input device that is mainly used to digitize vector-oriented design or pictures

           (4)   Dedicated line is a high speed cable line that is not permanently wired into the internet.

           (5)   A Router is a network device that helps LANs and WANs achieve interoperability and connectivity and that can link LANs that have different network topologies, such as Ethernet and Token Ring.

           (6)   Internet Protocol is a routable protocol in the backbone that is responsible for IP addressing, routing, and the fragmentation and reassembly of IP packets.

           (7)   Telnet is an Internet connection that enables a user to terminate an active connection with a computer at a remote site.

           (8)   ESD stands for Electronic Static Distance.

           (9)   IRQ is Interrupt ReQuest.

         (10)   Copyright computer programs made available on trial basis are called shareware.

         (B)   Please choose the most appropriate answer from the given set of answers. **(1 X 5)**

         (11)   What is the long form of 'CMOS'?
            (a)   Complimentary Metal Oxide Semiconductor
            (b)   Complex Metal Oxide Semiconductor
            (c)   Controller Metal Oxide Semiconductor
            (d)   Complimentary Metal Oxide Sets

         (12)   What is a Y-Connector?
            (a)   A Y-Shaped splitter cable that divides a source input into two output signals.
            (b)   A Y-Shaped splitter connector that divides a source input into two output signals.
            (c)   A Y-Shaped splitter card that divides a source input into two output signals.
            (d)   None of the above

COMPUTER SCIENCE

(13) What do you mean by 'IBM-Compatible'?
    (a) A computer that has a processor that is compatible with the original IBM PC.
    (b) A computer that has a processor that is similar to original IBM PC.
    (c) A computer that has a casing that is similar original IBM PC.
    (d) None of the above

(14) What do you mean by 'virtual'? Select all that apply:
    (a) In general, it distinguishes something that is merely conceptual from something that has physical reality.
    (b) Real
    (c) Not real
    (d) None of the above

(15) Select correct statement describing a term 'stateless'?
    (a) Having all information about what occurred previously
    (b) Having some information about what occurred previously
    (c) Having no information about what occurred previously
    (d) Having new information about what occurred previously

(C) Write short answers to the following: (1×5)
    (16) MAN
    (17) Polymorphism in OOPS
    (18) HTM L
    (19) Business management and IT.
    (20) Usenet

****

Partial text visible in left margin:
form.
(10)
a diagram.
idundancies
' Why or
(10)

not in
ts? Where
(10)
iming
s track of
(10)

e the
(1x10)
one

emely

used to

anently

's achieve
that have
a Ring.
iat is
tion and

inate an

s are

iswers.
(1 X 5)

it into

input

into

FEDERAL PUBLIC SERVICE COMMISSION

COMPETITIVE EXAMINATION FOR RECRUITMENT TO POSTS
IN BPS-17, UNDER THE FEDERAL GOVERNMENT, 2004

COMPUTER SCIENCE

TIME ALLOWED: 3 HOURS   **MAXIMUM MARKS: 100**

NOTE: Attempt **FIVE** questions in all, including **QUESTION NO. 8** which is **COMPULSORY**.
Select at least **ONE** question from each of the **SECTIONS-I, II,** and **III.** All question
carry equal marks.

SECTION-1

1. a) Explain the two strategic technologies to make the computer speedier; RISC and Parallel
Processing. Hence also differentiate between RISC and CISC.   (10)

   b) Discuss the sequential, indexed, and direct data organization.   (10)

2. a) Explain, shortly, different file management systems.   (10)

   b) Define and explain the Interleaved Processing Techniques.   (10)

3. a) Which are different tools to handle WAN traffic ? Explain them.   (10)

   b) What are communication protocols? Define Full Duplex and Synchronous Transmissions.
                                                                                          (10)

SECTION-II

4. a) Suppose that a non-negative weight w(e) is associated with each edge in an undirected
graph G = (V, E), give an efficient algorithm to find an acyclic subset of E of total
maximum weight.   (10)

   b) How can the number of strongly connected components of a graph change if a new edge is
added?   (10)

5. a) Differentiate between Object Oriented Programming and Procedural Programming. Also
explain the concept of Abstraction in OOP.   (10)

   b) Data-flow diagrams are means of documenting end-to-end data flow through a system;
explain this by sketching such diagram.   (10)

SECTION-III

6. a) What is the difference between a data entity in first normal form (1NF) and second normal
form (2NF)? Give an example of an entity in 1NF and show its conversion to 2NF.   (10)

   b) List and briefly describe the three table operations used to manipulate relational tables. (10)

7. a) What is Polygon Mesh Representation? Give at least two examples of polygon modeling
strategies.   (10)

   b) What are the tools to develop web pages in dynamic contents?   (10)

COMPUTER SCIENCE

COMPULSORY QUESTION

8. A) Write the terms, on your answer book, for whom the following abbreviations stand for;
    (i)   DML
    (ii)   EDI
    (iii) OLE
    (iv)   SDLS
    (v)   RAID
    (5)

    B) Please choose the most appropriate answer from the given set of options about all the following given statements.
    (i)   When all access and processing is done in one location, a computer system is said to be
    a) networked   b) distributed
    c) centralized   d) linked

    (ii)   Tools to change PROM chips, called
    a) chip kits   b) RAM burners
    c) PROM burners   d) none of these

    (iii) The type of modulation that changes the height of the signal is called
    a) frequency   b) phase
    c) amplitude   d) prophase

    (iv)   A connection for similar networks:
    a) satellite   b) bridge
    c) gateway   d) fax

    (v)   The technology whereby part of the program is stored on disk and is brought into memory for execution as needed is called
    a) memory allocation   b) virtual storage
    c) interrupts   d) prioritized memory
    (5)

    C) Write "True" or "False" in your answer book about the following statements:
    (i)   Application software may be either custom or packaged.
    (ii)   RISC technology uses more instructions than traditional computers.
    (iii) A ring network has no central host computer.
    (iv)   Satellites use line-of-sight transmission.
    (v)   Time-sharing is both event-driven and time-driven.
    (5)

    D) Write short answer to the following:
    (i)   Modularity
    (ii)   Telnet
    (iii) Cache Memory
    (iv)   Applet
    (v)   Function Overloading

(End)

FEDERAL PUBLIC SERVICE COMMISSION
COMPETITIVE EXAMINATION FOR RECRUITMENT TO POSTS IN BPS-17, UNDER THE FEDERAL GOVERNMENT, 2005

COMPUTER SCIENCE

TIME ALLOWED: 3 HOURS   **MAXIMUM MARKS: 100**

NOTE: Attempt FIVE questions in all, including QUESTION NO. 8 which is COMPULSORY. Select at least ONE question from each of the SECTIONS-I, II, and III. All question carry equal marks.

SECTION-I

1.   a)   What is decentralized processing? Also explain distributed data processing.   (10)

     b)   How would shared memory be used to communicate data between two processes?   (10)

2.   a)   Explain different methods for processing of data files.   (10)

     b)   What are network protocols? Explain any two common LAN protocols.   (10)

3.   a)   Explain any three widely used media for wireless communication.   (10)

     b)   What is pipelining? Hence also explain the strategy of parallel processing.   (10)

SECTION-II

4.   a)   Explain the term Information Hiding. Also dedifferentiate between Top-down Design and Bottom-up Design.   (10)

     b)   Discuss, briefly, the main characteristics of object oriented programming.   (10)

5.   a)   Show that by removing at most $O(\lg n)$ edges, we can partition the vertices of any n-vertex tree into two sets A and B such that $|A| = \lceil n/2 \rceil$ and $|B| = \lceil n/2 \rceil$.   (10)

     b)   Give an efficient algorithm to determine if an undirected graph is bipartite.   (10)

SECTION-III

6.   a)   Differentiate between an operational database and a warehouse. What types of applications does each serve?   (10)

     b)   What is the difference between a data entity in second normal form (2NF) and third normal form (3NF)? Give an example of an entity in 2NF and show its conversion to 3NF.   (10)

7.   a)   What is Client Side Programming?   (10)

     b)   What are the tools to develop website fast and viewable?   (10)

COMPUTER SCIENCE

COMPULSORY QUESTION

8. (A) Write the terms, on your answer book, for whom the following abbreviations stand for;

    (i)   DNS
    (ii)   CMOS
    (iii) OSI
    (iv)   CASE
    (v)   DDE

    (5)

    (B) Fill in the following blanks, on your answer book, with the most suitable options for the following statements:

    (i)   A data path to transfer data is called _____

    (ii) What is a combination of I-time and E-Time called? _____

    (iii) The process of applying a formula to a key is called _____

    (iv) Distortion in the received signals is called _____

    (v)   DMA is a technique to transfer data between memory and _____

    (5)

    (C) Write "True" or "False" in your answer book about the following statements:

    (i)   RISC technology uses fewer instructions than traditional computers.

    (ii)   Direct file organization is combination of sequential and indexed file organization.

    (iii) Fax is a connection for similar networks.

    (iv)   Let $G = (V, E)$ be an undirected graph then G is a free tree.

    (v)   An entity instance is a single occurrence of an entity.

    (5)

    (D) Write short answer to the following:

    (i)   Prototyping
    (ii)   FAT
    (iii) Virtual Memory
    (iv)   Deadlock
    (v)   Abstraction

    (5)

(End)

(Page 2 of 2)