FEDERAL PUBLIC SERVICE COMMISSION

**COMPETITIVE EXAMINATION FOR
RECRUITMENT TO POSTS IN BS-17
UNDER THE FEDERAL GOVERNMENT, 2013**

COMPUTER SCIENCE

TIME ALLOWED:	(PART-I MCQs)	30 MINUTES	MAXIMUM MARKS: 20
THREE HOURS	(PART-II)	2 HOURS & 30 MINUTES	MAXIMUM MARKS: 80

NOTE: **(i)** **First** attempt **PART-I (MCQs)** on separate **OMR Answer Sheet** which shall be taken back after **30** minutes.
   (ii) **Overwriting/cutting of the options/answers will not be given credit.**
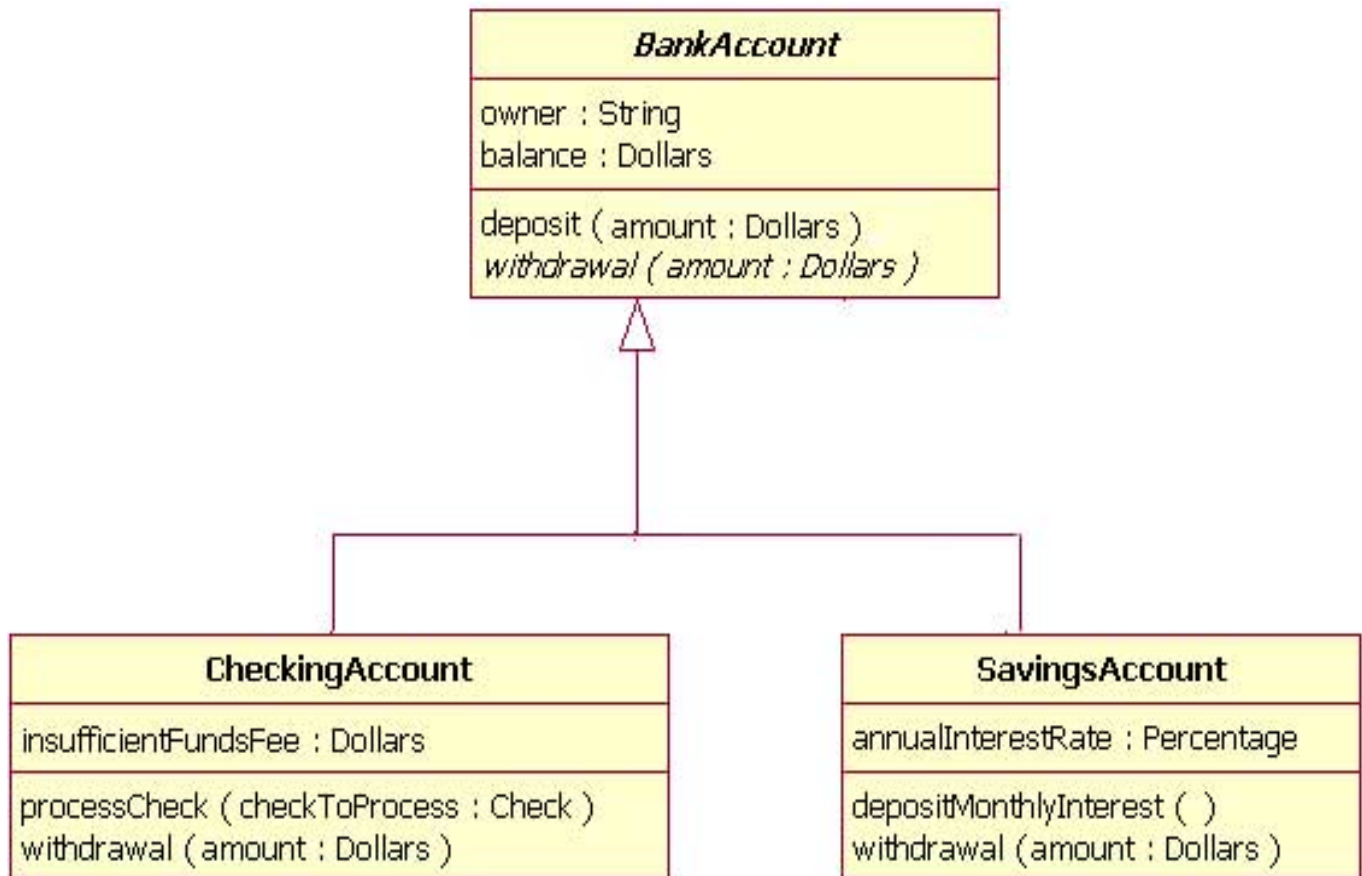   **(iii)** **Use of Calculator is allowed.**

PART-I ((MCQs) (COMPULSORY)

Q.1. (i) Select the best option/answer and fill in the appropriate Circle⬤ on the **OMR Answer Sheet.** **(20x1=20)**
   (ii) Answers given anywhere, other than OMR Answer Sheet, shall not be considered.

1. Which of the following best describes "virtual memory?"
   (a) A portion of the hard disk considered as RAM
   (b) Extended memory on the secondary storage that is used whenever physical memory is full
   (c) The abstraction of separating logical memory--memory as seen by the process--from physical memory--memory as seen by the processor
   (d) It is the page file in Windows folder   **(e)** None of these

2. The 'cmp' instruction modifies the:
   (a) Instruction register   **(b)** Flags register   **(c)** Segment register **(d)** None of these

3. Consider the following page reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1 Assuming there are 4 page frames available and that all frames are initially empty, what is the total number of page faults that would occur for the page reference string above if the least-recently-used (LRU) replacement policy is used?
   (a) 6   **(b)** 9   **(c)** 10   **(d)** 11   **(e)** None of these

4. The Banker's algorithm is used to _____.
   (a) Rectify deadlock   **(b)** Detect deadlock   **(c)** Prevent deadlock
   (d) Avoid deadlock   **(e)** None of these

5. The necessary conditions needed before deadlock can occur are _____.
   (a) No Mutual Exclusion, Hold and wait, Preemption, Circular Wait
   (b) Mutual Exclusion, No Hold and wait, Preemption, Circular Wait
   (c) Mutual Exclusion, Hold and wait, No Preemption, Circular Wait
   (d) Mutual Exclusion, Hold and wait, Preemption, No Circular Wait   **(e)** None of these

6. Difference between data link layer and transport layer error detection is that:
   (a) Data link detects transmission errors while transport layer detects segmentation faults
   (b) Data link detects node-to-node errors while transport layer detects end-to-end errors
   (c) Data link detects end-to-end errors while transport layer detects node-to-node errors
   (d) Data link detects segmentation errors while transport layer detects bit error **(e)** None of these

7. Phase shift keying (PSK.) method is used to modulate digital signals at 9600 bps using 16 levels. The line signals speed (i.e. modulation rate) will be:
   (a) 1200 bands   **(b)** 2400 bands   **(c)** 4800 bands   **(d)** 9600 bands **(e)** None of these

8. Exception handling is a powerful technique that separates error-handling code from _____ code.
   (a) Buggy   **(b)** Faulty   **(c)** Normal   **(d)** Exceptional **(e)** None of these

9. When a subroutine is called, the address of the instruction following the CALL instructions stored in/on the:
   (a) Stack pointer   **(b)** Accumulator   **(c)** Program counter **(d)** Stack   **(e)** None of these

10. Binary tree "preorder" traversal is defined recursively as follows:
   (a) Traverse left subtree, visit the root, traverse right subtree
   (b) Traverse right subtree, visit the root, traverse left subtree
   (c) Visit the root, traverse left subtree, traverse right subtree
   (d) Traverse left subtree, traverse right subtree , visit the root   **(e)** None of these

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11. What value will return to the operating system upon the successful completion of a program?
    (a) -1   **(b)** 1   **(c)** 0   **(d)** None of these

12. Which of the following is TRUE about given UML diagram?

```
                        ┌─────────────────────────────┐
                        │         BankAccount         │
                        ├─────────────────────────────┤
                        │ owner : String              │
                        │ balance : Dollars           │
                        ├─────────────────────────────┤
                        │ deposit ( amount : Dollars ) │
                        │ withdrawal ( amount : Dollars ) │
                        └─────────────────────────────┘
```

```
┌─────────────────────────────────┐      ┌─────────────────────────────────┐
│         CheckingAccount         │      │         SavingsAccount          │
├─────────────────────────────────┤      ├─────────────────────────────────┤
│ insufficientFundsFee : Dollars  │      │ annualInterestRate : Percentage │
├─────────────────────────────────┤      ├─────────────────────────────────┤
│ processCheck ( checkToProcess : Check ) │ depositMonthlyInterest ( )      │
│ withdrawal ( amount : Dollars ) │      │ withdrawal ( amount : Dollars ) │
└─────────────────────────────────┘      └─────────────────────────────────┘
```

    (a) Checking Account is a generalization of Saving Account
    (b) Bank Account is composition of Checking Account and Saving Account
    (c) Saving Account can process Check
    (d) Checking Account has a balance?   **(e)** None of these

13. The advantages of creating a prototype are:
    (a) It allows developers to experiment with number of different design options
    (b) It can serve as means of communication between developers and customers
    (c) It is better than water fall model
    (d) Both (a) and (b)   **(e)** None of these

14. Choose the correct statement.
    (a) Testing can show the presence of bugs but never their absence
    (b) Testing can always find all the bugs
    (c) Testing can always be exhaustive
    (d) If we test enough then we can find all of the bugs   **(e)** None of these

15. Which of the following operations need the participating relations to be union compatible?
    (a) UNION   **(b)** INTERSECTION   **(c)** DIFFERENCE   **(d)** All of these   **(e)** None of these

16. The language used in application programs to request data from the DBMS is referred to as the:
    (a) DML   **(b)** DDL   **(c)** VDL   **(d)** SDL   **(e)** None of these

17. What is the correct XHTML for a paragraph?
    (a) <P></p> **(b)** <P></P>   **(c)** <p></p>   **(d)** </p><p> **(e)** None of these

18. Which of the following HTML form method is suitable when you need to send larger form submissions?
    (a) Get   **(b)** Post   **(c)** Both Get and Post   **(d)** Ajax   **(e)** None of these

19. (2,4) is a point on a circle that has center at the origin. Which of the following points are also on circle?
    (a) (2,-4)   **(b)** (-2,4)   **(c)** (4,-2)   **(d)** All of above   **(e)** None of these

20. In Bresenham's algorithm, while generating a circle , it is easy to generate?
    (a) One octant first and other by successive reflection
    (b) One octant first and other by successive rotation
    (c) One octant first and other by successive translation
    (d) All octants   **(e)** None of these

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PART-II

NOTE: (i) **Part-II** is to be attempted on the separate **Answer Book**.
    (ii) Candidate must write **Q. No.** in the **Answer Book** in accordance with **Q. No.** in the **Q. Paper**.
    (iii) Attempt **ONLY FOUR** questions from **PART-II**, selecting at least **ONE** question from **EACH SECTION. ALL questions carry EQUAL marks.**
    (iv) Extra attempt of any question or any part of the attempted question will not be considered.
    (v) **Use of Calculator is allowed**.

SECTION-A

Q.No.2. (a) Define latency, transfer and seek time with respect to disk I/O. Compare given disk scheduling algorithm for cylinder requests in order 11, 1, 36, 16, 34, 9, 12: **(8)**
- First-come, first served (FCFS)
- Shortest-seek-time-first (SSTF)
- SCAN and C-SCAN
- LOOK and C-LOOK

(b) Write short notes on the following: **(4each)** **(12)**
- a. Semaphore
- b. Belady's Anomaly
- c. Thrashing

Q.No.3. (a) What is the significance of OSI model in communication paradigm? Compare layers of OSI with TCP/IP protocol stack. **(8)**

(b) Compare IEEE 802.3, IEEE 802.4 and IEEE 802.5? Also mention their problems and applications. **(8)**

(c) Differentiate between Link State and Distance Vector routing protocols. **(4)**

SECTION-B

Q.No.4. (a) What is the concept of inheritance in OOP paradigm? How can we achieve inheritance in JAVA? **(8)**

(b) Why is a B+ tree a better structure than an AVL tree for implementation of an indexed sequential file? Explain this with an example. **(6)**

(c) Convert the expression ((A + B) * C - (D - E) ^ (F + G)) to equivalent Prefix and Postfix notations. **(6)**

Q.No.5 (a) Describe the spiral model of software development with its application. **(7)**

(b) Write a note on the following:
- Software Quality Assurance **(5)**
- Smoke Testing **(4)**
- Extreme Programming **(4)**

SECTION-C

Q.No.6 (a) What are the main features of the Relational data model? Why is it more useful than Hierarchical data model? **(7)**

(b) What is 2PL? Give a schedule of two complete transactions that are not allowed by 'strict 2PL' scheduler but are accepted by basic 2PL scheduler. **(7)**

(c) Write note on any **ONE** of the following: **(6)**
- a. ERD
- b. Normalization

Q.No.7. (a) What is the significance of JavaScript in web development? Why is input validation done on client side? **(5)**

(b) Explain any **THREE** of the following: **(5 each)** **(15)**
- Affiliate Marketing
- Web Services
- Server Side Scripting
- SEO

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