Sikkim Public Service Commission

Main Written Examination for the Post of Software Developer
Paper II
Main Paper

Time Allowed : 3.00 Hrs.

Maximum Marks : 300

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before answering the questions :-

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.

2. Use only Black Ball Point Pen to fill the OMR sheet.

3. Do not write anything else on the OMR Answer Sheet except the required information.

4. This Test Booklet contains two sections, Section I & Section II

5. Section I consists of 75 Multiple Choice Questions of 2 marks each. Candidates are required to attempt all of them on the OMR sheet provided.

6. Section II consists of Short Answer type questions & Long Answer type questions. Candidates are required to attempt all of them on the Separate answer sheet provided.

7. **Marking Scheme**

    THERE WILL BE NEGATIVE MARKING FOR WRONG ANSWERS MARKED BY A CANDIDATE IN THE OBJECTIVE TYPE QUESTION PAPERS.

    (i)   There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, one-third of the marks assigned to that question will be deducted as penalty.

    (ii) If a candidate gives more than one answer, it will be treated as a wrong answer even if one of the given answers happens to be correct and there will be same penalty as above to the question.

    (iii) If a question is left blank. i.e., no answer is given by the candidate, there will be no penalty for that question.

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

Software Developer – Paper II

Section I

Multiple Choice Questions [75x2=150]

1) Which deadlock term listed below is one of the ways by which it periodically invokes to test the deadlock?
   - A) Prevention
   - B) Avoidance
   - C) Detection
   - D) Deletion

2) In the following, which are the proposals for processor assignment and multiprocessor thread scheduling?
   - I. Load Sharing
   - II. Gang Scheduling
   - III. Dynamic Scheduling
   - IV. Load Scheduling

   - A) i, ii and iii only
   - B) ii, iii and iv only
   - C) i, iii and iv only
   - D) i, ii, iii and iv

3) Which of the Software model is most suitable if requirements are easily defined and understandable?
   - A) Spiral Model
   - B) Prototyping Model
   - C) Waterfall Model
   - D) None of the above

4) Identify the option which is not risk management activity.
   - A) Risk generation
   - B) Risk assessment
   - C) Risk control
   - D) None of the above

5) Among the options listed below identify all the restrictions on deadlock avoidance:
   - I. The maximum resource requirement for each process must be stated in advance
   - II. There must be fixed number of resources to allocate
   - III. No process may exit while holding resources.

   - A) i and ii only
   - B) ii and iii only
   - C) i and iii only
   - D) i, ii and iii

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6) Selection in SQL is achieved by using ....
   A) WHERE
   B) SELECT
   C) CREATE
   D) FROM

7) Which of the following is/are the advantages of load sharing?
   I.   Preempted threads are unlikely to resume execution on the same processor.
   II. The central queue occupies a region of memory that must be accessed in a manner that enforces mutual exclusion.
   III. If all threads are treated as a common pool of threads, it is unlikely that all of the threads of a program will gain access to processors at the same time.

   A) i and ii only
   B) ii and iii only
   C) i and iiii only
   D) i, ii and iii

8) The software component that adds a specific feature to an existing computer program is called
   A) program
   B) hardware
   C) plugin
   D) system call

9) The object-oriented design of software has the following properties.
   A) Inheritance of the class
   B) Different classes
   C) Classes are based on the attributes of the object
   D) All of the above

10) In the following sequence 20, 15, 10, 5, ... What will be the 15th term?
   A) -50
   B) -55
   C) 45
   D) -65

11) Which method is used to recover from deadlock?
   A) Process termination
   B) Resource preemption
   C) Resource non-preemption
   D) Process termination and Resource pre-emption

12) Let A and B be two finite sets such that n(A) = 20, n(B) = 28 and n(A ∪ B) = 36, find n(A ∩ B).
   A) 21
   B) 12
   C) 14
   D) 11

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13) Which of the following are the algorithms that have been developed for making the short-term-scheduling decision?
   I.   Round robin
   II. Shortest Process Next (SPN)
   III. Shortest Remaining Time (SRT)
   IV. Feedback

   A) i, ii and iii only
   B) ii, iii and iv only
   C) i, iii and iv only
   D) i, ii, iii and iv

14) In ASP.NET, which of the following tool is used to manage the GAC?
   A) RegSvr.exe
   B) GacUtil.exe
   C) GacSvr32.exe
   D) GacMgr.exe

15) Among the following options which is/are the basic algorithms that are used for selection of a page to replace in replacement policy?
   I.   Optional
   II. Least recently used (LRU)
   III. First in first out (FIFO)
   IV. Last in first out (LIFO)

   A) i, ii and iii only
   B) ii, iii and iv only
   C) i, iii and iv only
   D) i, ii, iii and iv

16) The focus on reusable code in programming is called ....
   A) Normal coding
   B) Semantic coding
   C) Component programming
   D) Content programming

17) In an OS, for a Safe state which of the following is true?
   A) ideal state
   B) non-deadlocked state
   C) deadlock state
   D) spooling state

18) FAST in software engineering stands for which of the following?
  A) Functional Application Software Testing
  B) Future Application Specification Technique
  C) Facilitated Application Specification Technique
  D) Functionally Applied Specified Technique

19) C++ is a ....
  A) complete OOP language
  B) not a complete OOP language
  C) is a structured oriented programming language
  D) None of the above.

20) In how many ways can 3 cats and 4 dogs can be arranged in a row so that they are alternates?
  A) 188
  B) 165
  C) 12
  D) 144

21) Which of the following is/are the types of operations that may be performed on the directory?
  I.   Create file
  II.   Search
  III. Create directory
  IV.   Update directory

  A) i, ii and iii only
  B) ii, iii and iv only
  C) i, ii and iv only
  D) i, ii, iii and iv

22) Calculating the checksum of 10101001 and 00111001 is ....
  A) 11110001
  B) 11100001
  C) 00001101
  D) 00011101

23) In time-shared operating system which scheduling policy is most suitable?
  A) First-come-first-serve
  B) Longest job first
  C) Round-robin
  D) Shortest job first

24) Projection is SQL is achieved by using ....
   A) PROJECT
   B) SELECT
   C) WHERE
   D) CREATE

25) In software engineering Context Diagram explains about ....
   A) the overview about the system
   B) the entities of the system
   C) the attributes of the system
   D) the system external view

26) State whether the following statements about response time are True or False.
   I.   An example is response time in a interactive system
   II.   It is visible to the user and is naturally of interest to the user
   III. In the case of response time, a threshold may be defined.

   A) i-False, ii-True, iii-False
   B) i-True, ii-True, iii-False
   C) i-True, ii-False, iii-True
   D) i-True, ii-True, iii-True

27) Which of the following denotes Cyclomatic complexity?
   A) U(G)=number of regions of the graph
   B) U(G)=π+1
   C) U(G)=e-n+2P
   D) All of the above

28) PDU in the OSI model stand for ....
   A) Principle Data Unit
   B) Protected Data Unit
   C) Pointed Data Unit
   D) Protocol Data Unit

29) The translator used in JAVA programming language ....
   A) is only the compiler
   B) is only the interpreter
   C) are both compiler and interpreter
   D) None of the above

30) By default in ASP.NET, which class does the ASP.NET Web Form class inherit from?
   A) System.Web.UI.Page
   B) System.Web.UI.Form
   C) System.Web.GUI.Page
   D) System.Web.Form

31) In the search engine, which of the following is used to generate hundreds of relevant long-tail keywords for any topic?
   A) Keyword tools
   B) Keyword manipulator
   C) Keyword dragger
   D) None of the above

32) Identify the device(s) that belongs at the data link layer of the OSI model.
   A) Switch
   B) Bridge
   C) VPN
   D) Router

33) Which of the optimal scheduling algorithm is used in terms of minimizing the average waiting time of a given set of process?
   A) FCFS scheduling
   B) Round robin scheduling algorithm
   C) Shortest job first scheduling algorithm
   D) Priority scheduling algorithm

34) NULL value in SQL indicates ....

   I.   Value is unknown
   II.   Zero value
   III. Value does not exist

   A) II and III
   B) Only III
   C) I and II
   D) All of these

35) Of the options given below, which should be considered for Software design which is derived from the behavioural class model?
    A) DFD
    B) ER diagram
    C) State Transition Diagram
    D) Flow chart

36) Choose the correct one for the Flash memory.
    A) Non-volatile
    B) Volatile
    C) Both A. and B.
    D) None of the above

37) Identify the one which is not used for the size measurement for software.
    A) KLOC
    B) Banker's algorithm
    C) Halstead's Program length
    D) Function point

38) In a network if the IP address is allotted 172.16.2.120 and the subnet mask of 255.255.255.0. The total number of hosts which will be available is ....
    A) 510
    B) 254
    C) 16,372
    D) 128

39) How must be the functional condition of the point when points within set are connected by line segment?
    A) Included in class
    B) Does not include in set
    C) Included in set
    D) Included in proposition

40) The worst type of coupling in software design is ....
    A) data coupling
    B) common coupling
    C) content coupling
    D) internal coupling

41) Which of the following can avoided Cascading rollback?
    A) Cannot be avoided
    B) No protocol required for avoiding
    C) Strict two-phase locking protocol
    D) Two phase locking protocol

42) In a real time operating system, choose whether the following statements are True or False.
    I.   fast process or thread switch
    II. ability to respond to external interrupts quickly.
    III. minimization of intervals during which interrupts are enabled.
    IV. preemptive scheduling based on priority

    A) i, ii and iii only
    B) ii, iii and iv only
    C) i, ii and iv only
    D) i, ii, iii and iv

43) Designing of internal programming is called ....
    A) compiler
    B) interpreter
    C) intermodular interface design
    D) information design

44) Which layer in OSI model corresponds to IP?
    A) Session layer
    B) Transport layer
    C) Network layer
    D) Physical layer

45) If

    $p = It is hot$
    $q = I will go to cinema$
    "It is hot and I will not go to cinema", will be denoted by ....

    A) $p \wedge q$
    B) $p \wedge \sim q$
    C) $\sim p \wedge q$
    D) $\sim(p \wedge q)$

46) In DBMS the relationship is given by R (A,B,C) and the set of functional dependencies are F = { AB->C, B->D, D->B}. Identify the candidate key(s).
    A) AB and BD
    B) AB
    C) AD
    D) AB and AD

47) In Indexing the index consist of ....
    A) Pointer to the record
    B) A list of key
    C) Both A. and B.
    D) None of the above.

48) In linear programming, constraints can be represented by ....
    A) equalities
    B) inequalities
    C) ratios
    D) equalities and inequalities

49) The following is not a search engine.
    A) AOL
    B) Yendex.ru
    C) YaCy
    D) PicaSearch

50) Which of the IP address is reserved for the multicast communication?
    A) Class A
    B) Class B
    C) Class C
    D) Class D

51) Among the following models which one estimates the total effort in terms of person, months of the technical project staff?
    A) Waterfall model
    B) Spiral model
    C) COCOMO model
    D) Prototyping model

52) Which phenomenon is considered when there is wasted space internal to a partition due to the fact that the block of a data loaded is smaller than the partition?
    A) external fragmentation
    B) internal fragmentation
    C) simple fragmentation
    D) dynamic fragmentation

53) Blind write appears in which of the following?
    A) View serialization schedule
    B) Conflict serializable schedule
    C) Both A. and B.
    D) None of the above

54) DML and DDL statements are compiled and executed by ....
   A) Transaction Manager
   B) Storage Manager
   C) Query Processor
   D) Data Model

55) The relationship of data elements in a module is called ....
   A) cohesion
   B) coupling
   C) modularity
   D) stability

56) Which of the following is/are the characteristics of RAID architecture?
   I.   RAID is set of physical disk drives viewed by the operating system as a single logical drive
   II.   Data are distributed across the physical drives of an array
   III. It is used to store parity information, which guarantees data recoverability in case of disk failure.

   A) i and ii only
   B) ii and iii only
   C) i and iiii only
   D) i, ii and iii

57) At particular moment of time the data in the database is called ....
   A) Snapshot
   B) Schema
   C) Extension
   D) Intension

58) In a tournament, there are 153 matches played. Every two-team played one match with each other. The number of teams participating in the championship is ....
   A) 19
   B) 18
   C) 16
   D) 17

59) State whether the following statements about long term scheduling are True or False.
   I.   It controls the degree of multi-programming
   II. It determines which programs are admitted to the system for processing.
   III. It is the part of swapping function.

   A) i-False, ii-True, iii-False
   B) i-True, ii-True, iii-False
   C) i-True, ii-False, iii-True
   D) i-False, ii-True, iii-True

60) DNS is used to locate which of the following?
   A) root domain of URL
   B) domain name of URL
   C) IP address of URL
   D) MAC address of URL

61) The mistakes in software coding are ....
   A) bugs
   B) failures
   C) defects
   D) virus

62) The work of a Firewall is ....
   A) for measuring performance
   B) a program which enhance the flow of power supply
   C) a wall to protect the fire in the server
   D) None of the above

63) In how many ways can 4 apples, 8 mangoes and 4 oranges can be arranged in a row so that all the fruits of same type are together in the row?
   A) 3!
   B) 3!4!8!4!
   C) 4!8!4!
   D) 4!8!

64) Identify which one is true for the validation.
   A) checking the product
   B) evaluation of developer's performance
   C) checking the product by the customer
   D) checking the process

65) Which scheduler controls the degree of multiprogramming?
   A) Short term scheduler
   B) Long term scheduler
   C) Middle term scheduler
   D) Pre term scheduler

66) Atomicity is managed by which of the following?
   A) Recovery management component
   B) Concurrency control component
   C) Transaction management component
   D) All of the above

67) Minimal super key is ....
   A) Primary Key
   B) Candidate key
   C) Secondary Key
   D) Foreign Key

68) The technique(s) for performing I/O management function is/are ....
   A) Programmed I/O
   B) Interrupt driven I/O
   C) Direct Memory Access
   D) All of the above

69) The variety of mechanisms provided by UNIX for inter-processor communication and synchronization are as follows:
   I.   Pipes
   II. Messages
   III. Shared Memory
   IV. Main Memory
   V.   Semaphores

   A) i, ii, iii and iv only
   B) i, ii, iii and v only
   C) i, iii, iv and v only
   D) ii, iii, iv and v only

70) Identify which one is not appropriate for the software.
   A) Software is a product of a program
   B) Software is non-upgradable
   C) Software is flexible
   D) Software does not wear out

71) Which of the following process is considered for assigning similar entities to entity type?
   A) Generalization
   B) Specialization
   C) Instantiation
   D) Classification

72) With ...., requested resources are granted to processes whenever possible.
   A) deadlock detection
   B) deadlock deletion
   C) deadlock prevention
   D) deadlock avoidance

73) The Beta testing are tested by ....
   A) developers
   B) users
   C) coder
   D) All of the above

74) The work of FTP in computer network is ....
   A) used to browse web
   B) used to send emails
   C) a protocol to transfer files between computers
   D) None of the above

75) Highest reliability is found in which of the following topology?
   A) Mesh topology
   B) Star topology
   C) Ring topology
   D) Bus topology

Short answer type questions (Any Five) [5x15=75]

1) How many different words can be formed using the letters of string "ELLEHEBED"? Also,

   a. When vowels occupy the even position.

   b. Both the character 'L' does not occur together.

2) What are different classes of IP address and what are the range of each class? Why do we need the classification? List the key differences of IPv4 and IPv6.

3) Solve the following:

   a. If the sums of n terms of two AP are in the ratio 2n+5:3n+4, then what is the ratio of their n^{th} terms?

   b. Find a GP for which the sum of first two terms is -4 and the fifth term is 4 times the third term.

   c. Consider that a, b, c are in HP. Can we conclude that a/b+c, b/c+a, c/a+b is also in HP?

4) Why do we use multithreading? List the different categories of Process Scheduling. What are scheduling queues? List the different types of schedulers, explain in brief.

5) List the DDL and DML commands. Give an example for each command.

6) State De Morgan's law. Check the validity of the arguments listed below using Discrete mathematical logics:

   "If I study, I will not fail in the test."

   "If I do not watch movie in the evening, I will study."

   "I failed in the test."

   "Therefore, I must have watch movie in the evening."

7) What is VPN and when do we need VPN? What are the types of VPN? Discuss the protocols of VPN.

8) Write a program in OOP to display the following. Use user define function(s). Generalize the structure of the following to any size.

```
        A
      A   A
    A       A
   A         A
    A       A
      A   A
        A
```

9) Explain the algorithm of the tree traversal with an example. Write a program in OOP for the tree traversal (Use recursive function wherever is possible).

10) Describe the characteristics of OOP. Explain the different forms of inheritance with simple programming examples.

11) Solve the following:

   a. In a games and sports meet, the organizing committee awarded medals in different categories. 36 medals in swimming, 12 medals in athletics and 18 medals in indoor games. If these medals went to a total of 45 persons and only 4 persons got medals in all the three categories, how many received medals in exactly two of these categories?

   b. Total number of persons in a group is 100. Out of the 100 persons 72 people can speak Hindi and 43 can speak Bengali. How many can speak Hindi only? How many can speak Bengali only and how many can speak both Hindi and Bengali?

12) Distinguish between OSI and TCP/IP model. Explain the TCP/IP model. How many protocols are there in the transport layer of TCP/IP? List the protocols in brief.

13) Explain Banker's Algorithm with an example. Write the Request Resource Algorithm and Safety Algorithm.

14) Consider yourself as a software developer. You are being ask to design and develop a software from scratch. Give an abstract of the software which is required. Which type of software model you will adopt? Implement it step by step in the software development model. Also explain why you choose the particular model? What type of testing will you use and why?