ROLL NO

PUNJAB PUBLIC SERVICE COMMISSION

COMBINED COMPETITIVE EXAMINATION FOR RECRUITMENT TO THE POSTS OF PROVINCIAL MANAGEMENT SERVICE, ETC -2023 CASE NO. 1C2024

SUBJECT: COMPUTER SCIENCE (PAPER-II)

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

NOTE:

i. All the parts (if any) of each Question must be attempted at one place instead of at different places.
ii. Write Q. No. in the Answer Book in accordance with Q. No. in the Q. Paper.
iii. No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.
iv. Extra attempt of any question or any part of the question will not be considered.

NOTE: **Attempt any FIVE Questions in All. Calculator is allowed (Non- Programmable)**

Q.No.1 Give Implementation-level description of Turing machine that decide the following language.

$\{1^{n^2} \mid n \geq 1\}$, the language consisting of all strings of 1s whose length is a square number. Some example words of the language are as follows:

a. 1
b. 1111
c. 111111111
d. 1111111111111111

To make the implementation easy you may use two tapes, one for the input and the other for keeping record of calculations. The second tape is initially empty and its head points to first cell. **(20 Marks)**

Q.No.2 **(a)** Which factors does the compiler need to consider when applying optimizations?

(b) What are the different scopes of compiler optimizations? What is the tradeoff when considering the scope of optimizations to use?

(c) In Local optimizations, consider the following code.

a:= 1
b:= f+a
c:=a
d:=f+a
e:=f+c
f:=b
g:=f+a

Build a Directed Acyclic Graph (DAG) for the code. **(3+7+10=20 Marks)**

Q.No.3 Approximate the Dominant Eigenvalue and corresponding Eigenvector for the matrix $\begin{bmatrix} 0 & 11 & -5 \\ -2 & 17 & -7 \\ -4 & 26 & -10 \end{bmatrix}$ by using Power Method. Start with $X_0 = (1,1,1)^t$. (Five iterations only and take result up to 3 decimal places) **(20 Marks)**

Q.No.4 Transform the given Student table into third normal form. **(20 Marks)**

Student Table

Student-ID	Course-ID	Student-Name	Course-Name	Grade	Faculty	Faculty-Phone-No
BS1	CS318	Muhammad Ali	Database System	B	Management Sciences	92112211
BS1	CS301	Muhammad Ali	Programming Fundamentals	A	Software Engineering	92244556
BS2	CS318	Javed Ahmad	Database System	C	Management Sciences	92112211
BS3	CS318	Salman Khan	Database System	A	Management Sciences	92112211
BS4	CS301	Bilal Murshad	Programming Fundamentals	B	Software Engineering	92244556
BS4	CS318	Bilal Murshad	Database System	B	Management Sciences	92112211
BS4	CS320	Bilal Murshad	Project Management	A	Management Sciences	92112211

Q.No.5

(a) What is SDLC?

(b) What are the various models available in SDLC?

(c) Explain the concept of Modularization.

(d) What are the various phases of SDLC?

(e) What is Black box testing? **(4x5=20 Marks)**

Q.No.6 Based on your experience with software development project, answer briefly these questions about the software life cycle.

A) Which stage was most difficult? Why?
B) What did your team do in response?
C) Which stage was most straightforward? Why?

Answer briefly each of these questions about test-first development.

D) Identify two advantages that come with writing tests before code.
E) What trade-off does a tester make between looking at the code before writing tests and after writing tests?

Answer briefly each of these questions about refactoring.

F) What is refactoring?
G) What role does refactoring play in the design of software?
H) What is the relationship between refactoring and testing? **(20 Marks)**

Q.No.7 Can a computer think? **(20 Marks)**

Q.No.8

(a) Which algorithm is used by Facebook for face recognition? Explain its working.

(b) Give the steps for A* algorithm?

(c) What do you understand by the fuzzy logic?

(d) What is a heuristic function, and where is it used? **(4x5=20 Marks)**

ROLL NO

PUNJAB PUBLIC SERVICE COMMISSION

COMBINED COMPETITIVE EXAMINATION FOR RECRUITMENT TO THE POSTS OF PROVINCIAL MANAGEMENT SERVICE, ETC -2023 CASE NO. 1C2024

SUBJECT: COMPUTER SCIENCE (PAPER-I)

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

NOTE:
i. All the parts (if any) of each Question must be attempted at one place instead of at different places.
ii. Write Q. No. in the Answer Book in accordance with Q. No. in the Q. Paper.
iii. No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.
iv. Extra attempt of any question or any part of the question will not be considered.

NOTE: Attempt FIVE Questions in All. Attempt at least ONE question from each Section.

SECTION-A

Q No.1: **a)** Identify the number of Hexadecimal digits needed to represent each of the following binary values:

(i) A binary value having 16 bits.
(ii) A binary value having 25 bits.

b) Convert the decimal value "25" into its binary form. You are required to show all steps of conversion. **(8+12=20 Marks)**

Q No.2: **a)** Write down the algorithm to convert km into meters.

1Km=1000m

b) Write the phases of three-step development process which incorporates testing in each SDLC phase instead of using testing as a separate phase. **(12+8=20 Marks)**

Q No.3: **a)** According to which Algorithm discovery approach, the whole task is broken down into simpler parts, and some of those tasks may need further subdivision.

b) Write the definition of a function name Add() which takes two integer type arguments, add these arguments and return the result. **(5+15=20 Marks)**

SECTION-B

Q No.4: **a)** Write down the names of three main steps that are used in Pulse Code Modulation technique.

b) How many connections/links will be needed to connect 10 computers with each other in a direct point to point network? Also write formula used for calculation. **(6+14=20 Marks)**

Q No.5: **a)** As you knew that Bridges forward frames based on the record in the database in the form of tables. Initially, this table is empty, i.e. No address or information for nodes is given, but gradually as the computer starts transferring data, table gets filled. You are required to mention the names of states of bridge in the following conditions:

(i) When a bridge first boots the address lists are empty.
(ii) When the list gets filled after the bridge has received at least one frame from each computer on the network.

b) Data Link Layer is located between the physical and the network layers. Enlist the names of the services provided by the Data Link Layer. **(12+8=20 Marks)**

P.T.O

Q No.6: **a)** Write down the Huntington postulates of Boolean algebra. Also give the differences between the Boolean algebra and Arithmetic and ordinary algebra?

b) What is use of Venn's diagram? Explain with figure. **(14+6=20 Marks)**

SECTION-C

Q No.7: **a)** Convert the following infix expression to the equivalent postfix expressions:

$$4+9/((3-5)+8)-7+2$$

b) Define Tree and explain basic terminologies related to tree in details. **(10+10=20 Marks)**

Q No.8: **a)** Briefly explain the main functions of an operating system.

b) Explain at least four scheduling algorithms in detail. Also tell which scheduling algorithm is mostly used in single process computer? **(10+10=20 Marks)**

Q No.9: **a)** Define deadlock. Differentiate between deadlock avoidance and deadlock prevention with example.

b) Define operating system. Explain different types of operating systems in detail? **(10+10=20 Marks)**