MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PCC-CS601/PCCCS601 Database Management Systems

UPID : 006577

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]

(i) The information about data in a database is called _____

(ii) Which one of the following commands is used to modify a column inside a table?

(iii) What is the full form of NTFS?

(iv) What is the full form of TCL?

(v) _____ ACID property states that only valid data will be written to the database

(vi) In which of the following formats data is stored in the database management system?

(vii) The database system must take special actions to ensure that transactions operate properly without interference from concurrently executing database statements. This property is referred to as_____

(viii) The database design prevents some data from being represented due to ____ anomaly.

(ix) We can use the following three rules to find logically implied functional dependencies. This collection of rules is called___.

(x) Which character function can be used to return a specified portion of a character string in SQL?

(xi) The normal form which satisfies multivalued dependencies and which is in BCNF is___

(xii) DBMS periodically suspends all processing and synchronizes its files and journals through the use of ____

Group-B (Short Answer Type Question)

Answer any three of the following : [5 x 3 = 15]

2. State Armstong's three axioms. [5]
3. What is functional dependency? What is join dependency? [5]
4. Explain Lossless and Lossy decomposition by using suitable examples. [5]
5. Write a short notes on B+ Tree and B- Tree [5]
6. What is metadata and what is data dictionary? [5]

Group-C (Long Answer Type Question)

Answer any three of the following : [15 x 3 = 45]

7. (a) What is the difference between DELETE, TRUNCATE and DROP commands? [3]
   (b) Explain various update anomalies that can arise in a relational database with examples. [7]
   (c) Explain the functionalities of DBA. [5]
8. (a) Why do we need query optimization? [3]
   (b) Consider the relation R(A, B, C, D, E) with the set of f = (A->C, B->C, C->D, DC -> C, CE -> A). Suppose the relation has been decomposed by relations R1(A,D), R2(A, B), R3(B, E), R4(C, D, e), R5(A, E). Is this decomposition lossless or lossy? Justify your answer. [8]
   (c) Write the features of tuple relational calculus. [4]
9. (a) Consider the relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies: F = {AB->C, A-> DE, B-> F, F->GH, D->IJ} Decompose R into 3NF. [7]
   (b) Define strong entity set and weak entity set. Give a proper example. [4]
   (c) What do you mean by derived attribute? Give an example. [4]
10. (A) What is blocking factor. Explain the difference between B-tree and B+ tree indexing with proper example. [5+5+5]
    (B) Insert the following elements in B-Tree of order 4:

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : EC602/PCC-CS602/PCCCS602 Computer Networks

UPID : 006596

Time Allotted : 3 Hours *Full Ma*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10

(I) Remote login protocol is known as _____

(II) What is meant by protocol in computer network?

(III) Layer-2 Switch is also called _____

(IV) Each IP packet must contain _____.

(V) Token bucket algorithm is an advanced form of _____

(VI) Mail transfer protocol is known as _____.

(VII) IP address of Loop back address is _____.

(VIII) What are the two categories of QoS attributes?

(IX) Three main division of the domain name space are _____.

(X) State the function of application Layer in brief.

(XI) Receiving window of selective repeat ARQ is _____.

(XII) Why IP Protocol is considered as unreliable?

Group-B (Short Answer Type Question)

Answer any three of the following : [5 x 3 =

2. Explain the functions of physical layer and Data link layer in brief.
3. Compare between CSMA/CD and CSMA/CA
4. Explain
   i. Repeater
   ii. Router
   iii. Gateway
5. How does firewall protect data?
6. What is meant by bit stuffing and why it is used?

Group-C (Long Answer Type Question)

Answer any three of the following : [15 x 3 =

7. (a) Discuss the working of Twisted pair cable
   (b) What is optical fiber? State the advantages of using optical fiber in computer network.
8. (a) Write short notes on: (i) Protocol using selective repeat (ii) Stop and Wait protocol
   (b) Discuss about VRC with an example.
9. (a) Explain token bucket algorithm
   (b) Draw the TCP header and explain its parts
10. (a) Compare between static and dynamic routing.
    (b) Explain the concept of RIP.
11. (a) Explain how FTP can be used to browse website?
    (b) Discuss about the Bluetooth architecture and protocols involved during Bluetooth enabled network.

*** END OF PAPER ***

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PEC-IT601B Distributed Systems

UPID : 006590

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]
   (i) What is data replication?
   (ii) What is minterm predicate?
   (iii) Define homogeneous distributed database.
   (iv) What is the maximum no of functional dependencies (trivial and non-trivial) of a relation R of degree n?
   (v) Write the full form of OLAP.
   (vi) What is data dictionary?
   (vii) Provide a technique for recovery management.
   (viii) Edit of a data item in a transaction is done in which mode?
   (ix) What are the attribute usage values?
   (x) What do you mean by granularity?
   (xi) What is the disadvantage of replication?
   (xii) Who is responsible for ensuring correct execution of a transaction in the presence of failures?

Group-B (Short Answer Type Question)

Answer any three of the following : [5 x 3 = 15]

2. What are the advantages and disadvantages of replication? What is auxiliary program? [5]
3. Write down the Dynamic query optimization methods with example. [5]
4. Which components are necessary for building a distributed database? [5]
5. Explain distributed cost model with example. [5]
6. What is DDBMS ? What are the features of DDBMS ? [5]

Group-C (Long Answer Type Question)

Answer any three of the following : [15 x 3 = 45]

7. Explain the following in detail: [8+4+3]
   i. Query optimization issues in DDBs.
   ii. World Wide Web Architecture and Protocols.
   iii. Data warehousing architectures.
8. What is flat transaction and nested transaction? [4+6+5]
   Discuss about dirty-read, fuzzy read and phantom.
   What is ACID in DDBMS?
9. Briefly describe the various implementations of the process pairs concept. Comment on how process pairs may be useful in implementing a fault tolerant distributed DBMS. [15]
10. Write down "Basic Timestamp Ordering Scheduler (BTO-SC) Algorithm". [8+7]
    Write down "Data Processor (DP) Algorithm" .
11. Discuss different types of search strategies. [6+4+5]
    What is search space in distributed query optimization?
    Simplify the following query, expressed in SQL, using idempotency rules:

```
SELECT ENO
FROM ASG
WHERE RESP = "Analyst"
AND NOT(PNO="P2" OR DUR=12)
AND PNO != "P2"
AND DUR=12
```

individual components obey pi = 0.8 qi = 0.5, where i = 1, 2, 3.

(b) Show that in a multiclass classification task the Bayes decision rule minimizes the error probability. [5]

(c) Prove that the covariance estimate [6]

$$\hat{\Sigma} = \frac{1}{N-1}\sum_{k=1}^{N}(\boldsymbol{x}_k - \hat{\boldsymbol{\mu}})(\boldsymbol{x}_k - \hat{\boldsymbol{\mu}})^T$$

is an unbiased one, where

$$\hat{\boldsymbol{\mu}} = \frac{1}{N}\sum_{k=1}^{N}\boldsymbol{x}_k$$

11. (a) What are the advantages and disadvantages of the histogram density estimator? [4]

(b) What can we learn from Histogram Density Estimation? [3]

(c) Consider the covariance matrix for a Gaussian with mean = (0,0) and variance = σ 2 × I2 where σ 2 is a positive constant, and I2 is a 2 × 2 identity matrix. [4+2+2]

i. What are the two principle components for this matrix? What are their eigenvalues?

ii. Given a data point (x,y) from this distribution, what is the reconstructed data using the projection onto the first principal component of this matrix?

iii. For this reconstructed value, what is the expected value of the reconstruction error (squared error between the true value and reconstructed value).

*** END OF PAPER ***

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : ESC-CSBS601/PEC-IT602D Pattern Recognition

UPID : 006592

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]

(i) If the covariance matrices for all of the classes are identical, then the discriminant functions will be----------.

(ii) Which suggests the existence of an efficient recursive algorithm for online smoothing?

(iii) Imagine you are dealing with text data. To represent the words, you are using word embedding (Word2vec). In word embedding, you will end up with 1000 dimensions. Now, you want to reduce the dimensionality of this high-dimensional data such that similar words should have a similar meaning in the nearest neighbor space. In such a case, Which algorithms would you choose

(iv) Principal component analysis is one important step in ----------.

(v) SVM stands for----------.

(vi) Decision tree is also referred to as_____ algorithm.

(vii) Linear Discriminant function is given by------- formula.

(viii) How does the state of the process is described in HMM?

(ix) PCA works better if there is _____.

(x) The most natural representation of hierarchical clustering is a corresponding tree, called------

(xi) Define unsupervised learning.

(xii) What is the formula for multivariate normal distributions?

Group-B (Short Answer Type Question)

Answer any three of the following : [5 x 3 = 15]

2. Explain supervised learning and unsupervised learning. [5]
3. Explain Normal Distribution with its characteristics. [5]
4. Define Bayesian classifier. Show that it is an optimal classifier. [5]
5. What is the fundamental difference between maximum likelihood parameter estimation and Bayesian parameter estimation? [5]
6. Explain Maximum Likelihood technique under Parameter Estimation of Classification. [5]

Group-C (Long Answer Type Question)

Answer any three of the following : [15 x 3 = 45]

7. (a) What is pattern recognition? [4]
   (b) State the advantages and disadvantages of PR Systems [6]
   (c) State the application of pattern recognition [5]
8. (a) Explain the concept of Prior, Posterior, and Likelihood with an example. [6]
   (b) Explain the Bayesian Decision Theory. [4]
   (c) Suppose box A contains 4 red and 5 blue coins and box B contains 6 red and 3 blue coins. A coin is chosen at random from the box A and placed in box B. Finally, a coin is chosen at random from among those now in box B. What is the probability a blue coin was transferred from box A to box B given that the coin chosen from box B is red? [5]
9. (a) Define Measurement space and Feature space in classification process for objects [4]
   (b) Explain the different types of learning techniques with examples. [6]
   (c) Discuss about the four best approaches for a Pattern Recognition system. [5]
10. (a) Suppose two categories consist of independent binary features in three dimensions with known feature probabilities. Construct the Bayesian decision boundary if $P(\omega1) = P(\omega2)=0.5$ and the [4]

65, 66, 70, 71, 74, 80, 91, 81, 99, 82, 75, 77, 89, 56

(C) Explain different Hashing techniques.

11. (A) What is the difference between vertical and horizontal fragmentation.

(B) Write short notes on Distributed database management system.

(C) Write a short notes on Web based database management system.

*** END OF PAPER ***

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : OEC-IT601A Numerical Methods

UPID : 006587

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]

(i) How many predictor and corrector steps does the fourth-order Runge-Kutta method use ?

(ii) Distinguish between Round off error and Truncation error.

(iii) If y = f(x) are known only at (n+1) distinct interpolating points, then what is the LaGrange polynomial degree.

(iv) The degree of precision of Trapezoidal rule is.

(v) When do you call a System of Linear Equation AX = B to be Consistent?

(vi) Find a root of the equation $x^2 - 2x - 5 = 0$ by Newton – Raphson method.

(vii) If 5/3 is approximated to 1.6667, then absolute error is

(viii) Find Newton's backward difference interpolation polynomial against the tabulated values:

x:	3	4	5	6
f(x):	6	24	60	120

(ix) THe degree of precision of Weddle's rule is

(x) What is the principle of LU factorization method ?

(xi) Find the forward interpolation polynomial for the function f(x) where f(0) = -1,f(1) = 1 ,f(2) = 1 and f(3) = -2.

(xii) Simpson's one third rule is applicable only if the number of sub-interval is

Group-B (Short Answer Type Question)

Answer any three of the following : [5 x 3 = 15]

2. Find the missing term from the following Interpolation table. [5]

x	F(x)
2	45
3	49.2
4	54.1
5	?
6	67.4

3. Evaluate $\int_{0.1}^{0.8}(e^x + 2x)dx$ by Trapezoidal Rule taking h=0.1, correct up to 5-decimal places. [5]

4. Using following data, find the value of y at x = 5 by the Newton's forwaed interpolation polynomial. [5]

X	0	10	20	30	40
Y	7	18	32	48	85

5. Solve the following equation by LU Decomposition methods: [5]

$$x+y+z=1,$$
$$4x+3y-z=6,$$
$$3x+5y+3z=4.$$

6. Using Newton's backward interpolation formula, find the annual premium at the age of 33 from the following data [5]

Age in years (x):	24	28	32	36	40
Annual premium(y):	28.06	30.19	32.75	34.94	40

Group-C (Long Answer Type Question)

Answer any three of the following : [15 x 3 = 45]

7. (a) Evaluate $\int_0^1 x^3 dx$, by Trapezoidal Rule, with n = 5. [7]

(b) Evaluate $\int_0^{\pi/2} \sqrt{1-0.162sin^2\varphi}\, d\varphi$, by Simpson's One Third Rule, correct up to two decimal places. [8]

8. (a) Find y(0.10) and y(0.15), by Euler's Method, from the differential equation, $\frac{dy}{dx} = x^2 + y^2$, y(0) = 0, correct upto four decimal places, taking step length h = 0.05. [7]

(b) Solve by Euler's modified method the following differential equation for x = 0.02, by taking step length h = 0.01. [8]

$\frac{dy}{dx} = x^2 + y$, y = 1 when x = 0.

9. (a) Using Lagrange Interpolation find the value of y at x=8 Given y(0) = 18, y(1) = 42, y(7) = 57 and y(9) =90 ? [8]

(b) Compute the value of f(7.5) from the following table [7]

x:	3	4	5	6	7	8
f(x):	27	64	125	216	343	512

10. (a) Find the value of the given variables by using Gauss elimination method: [7]

$$x + 3y + 6z = 10$$
$$x + 4y + 5z = 14$$
$$x + 6y + 7z = 18$$

(b) Solve the system of equations $x_1 + x_2 + x_3 = 1$, $3x_1 + x_2 - 3x_3 = 5$ and $x_1 - 2x_2 - 5x_3 = 10$ by LU factorization method. [8]

11. (a) Find the population of the city in 1925. The population of a city is given as: [8]

Year(x)	Population(Thousand)
1891	46
1901	66
1911	81
1921	93
1931	101

(b) Find the missing value of the following table: [7]

x:	2	4	6	8	10
y:	5.6	8.6	13.9	-	35.6

*** END OF PAPER ***

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : HSMC-501 Introduction to Industrial Management (Humanities III)

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]

(I) _____ is decided on the basis of ordering cost and carrying cost.
(II) What is GOLF Analysis
(III) What is Function Cost Matrix?
(IV) ERP supports _____ currency value
(V) Which type of organization is temporary by nature
(VI) Which colour is used to illustrate actual progress in bar charts?
(VII) What is the symbol for activity in a network diagram?
(VIII) _____ shows minimum stock to be maintained.
(IX) Production Planning and Control function is crucial for ensuring efficiency and cost savings in_
(X) State the types of values
(XI) Who is the head of production department?
(XII) What is PERT Analysis?

Group-B (Short Answer Type Question)

Answer any three of the following [5 x 3 = 15]

2. List, in order, the six steps basic to both PERT and CPM. [5]
3. Calculate minimum stock level, maximum stock level, and re-ordering level: [5]
(i) Maximum Consumption = 300 units per day
(ii) Minimum Consumption = 180 units per day
(ii) Normal Consumption =190 units per day
(iv) Reorder period = 10-15 days
(v) Reorder quantity = 2,000 units
(vi) Normal reorder period = 13 days.
4. Discuss the difference between CPM and PERT. [5]
5. State the difference between Industrial management and Product Management [5]
6. What is Job Shop Production? [5]

Group-C (Long Answer Type Question)

Answer any three of the following [15 x 3 = 45]

7. (a) Write a short note on JIT. [5]
(b) State the advantages of JIT. [10]
8. (a) State the difference between authority and responsibility [8]
(b) State the process of creating an organization [7]
9. (a) State the types of formal organization [10]
(b) Write a short note on informal organization [5]

10. A small project is composed of 7 activities whose time estimates are listed below. Activities are being identified by their beginning (i) and ending (j) node numbers. [15]

Activities		Time in weeks		
i	*j*	*to*	*tl*	*tp*
1	2	1	1	7
1	3	1	4	7
1	4	2	2	8
2	5	1	1	1
3	5	2	5	14
4	6	2	5	8
5	6	3	6	15

1. Draw the network
2. Calculate the expected variances for each
3. Find the expected project completed time
4. Calculate the probability that the project will be completed at least 3 weeks than expected
5. If the project due date is 18 weeks, what is the probability of not meeting the due date?

11. A manufacturing company places a semi-annual order of 24,000 units at a price of Rs. 20 per unit. Its carrying cost is 15% and the order cost is Rs. 12 per order. [15]

Calculate:

1. What is the most economical order quantity?
2. How many orders need to be placed?

*** END OF PAPER ***

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PCC-CS503 Object Oriented Programming

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]

(I) In which memory a String is stored, when we create a string using new operator?

(II) _____ is an abstract machine. It is a specification that provides runtime environment in which java bytecode can be executed.

(III) Which of the following keywords are used to control access to a class Member?

A) new
B) abstract
C) public
D) interface

(IV) An abstract class, which declared with the "abstract" keyword, cannot be instantiated. True or False?

(V) Out of the following which one is not correctly matched ?

A) JAVA - Object Oriented Language
B) FORTRAN - Object Oriented Language
C) C++ - Object Oriented Language
D) BASIC - Procedural Language

(VI) "A package is a collection of classes, interfaces and sub-packages"
The above statement is true or false?

(VII) Which of the following statements is valid array declaration?

A) int number ()
B) float average [ ]
C) int marks
D) count int[ ]

(VIII) Java virtual machine is _____. Fill in the blank.
A) platform dependent totally
B) independent
C) depends on machine architecture only
D) depends on OS only

(IX) Which method is used to set the graphics current color to the specified color in the graphics class?

(X) Java is robust because _____. Fill in the blank.

A) it is object oriented
B) garbage collection is present
C) inheritance is present
D) exception handling

(XI) Consider the following 2 statements(S1 and S2).
(S1) C++ uses compiler only.
(S2) Java uses compiler and interpreter both.
Above statements are true or false?

(xii) What is the length of the application box made by the following Java program?

```
import java.awt.*;
  import java.applet.*;
  public class myapplet extends Applet
  {
    public void paint(Graphics g)
    {
      g.drawString("A Simple Applet", 20, 20);
    }
  }
```

A) 20
B) 50
C) 100
D) System dependent

Group-B (Short Answer Type Question)
Answer any three of the following [5 x 3 = 15]

2. What is qualified association? Describe with an example [5]
3. What is an object? Why Java is called an object oriented language? Write the difference between procedural oriented programming and object oriented programming. [5]
4. Explain static keyword with suitable Java code. [5]
5. What is dynamic method dispatch in Java? Explain with an example. [5]
6. What AWT? What is Event Listener? [5]

Group-C (Long Answer Type Question)
Answer any three of the following [15 x 3 = 45]

7. Discuss the differences between the following: [5+5+5]
   i) 'throw' and 'throws' clause
   ii) final and finally
   iii) Abstract classes and Interfaces
8. Write short notes of the following: [5+5+5]
   i) Link and Association
   ii) Thread Life-Cycle
   iii) Abstraction
9. Write short notes of the following: [5+5+5]
   i) Dynamic method dispatch
   ii) Dynamic binding
   iii) Encapsulation
10. Create a package and write a java file with four methods for four basic arithmetic operations such as addition, subtraction, multiplication and division. These methods should save the file in the package. Write one more program that imports the above file to use those four methods. [15]
11. (a) What are exceptions? Explain the user defined exceptions and system defined exceptions with suitable examples. [2+6]
    (b) Briefly explain the use of "this" and "super" keywords. [4]
    (c) Difference between' = =" operator and "equals" methods in the context of string object. [3]

*** END OF PAPER ***

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : ESC501 Software Engineering

Full Marks :70

Time Allotted : 3 Hours

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

[1 x 10 = 10]

1. Answer any ten of the following :

(I) The CMMI was developed to combine multiple ____ into one framework..
- A) Meta model
- B) Business maturity models
- C) Bootstrap
- D) All of the mentioned above

(II) What is the use of CMMI?
- A) Decreases risks in software
- B) Encouraging a productive
- C) Streamlines process improvement
- D) All of the mentioned above

(III) Which of the following is a building block of UML?
- A) Things
- B) Relationships
- C) Diagrams
- D) All of the mentioned

(IV) Amongst which of the following is / are the Verification and validation activities.
- A) Technical reviews, quality and configuration audits
- B) Algorithm analysis, development testing, usability testing
- C) Qualification testing, acceptance testing, and installation testing
- D) All of the mentioned above

(V) To achieve good design, modules should have
- A). Low coupling, low cohesion
- B). Low coupling, high cohesion
- C). High coupling, low cohesion
- D). High coupling, high cohesion

(VI) The planning task is estimation of the resources required to accomplish the software development effort.
- A) True
- B) False

(VII) Which of the following term is best defined by the statement:"a structural relationship that specifies that objects of one thing are connected to objects of another"?
- A) Association
- B) Aggregation
- C) Realization
- D) Generalization

(VIII) A typical configuration management (CM) operational scenario involves a ____ who is in charge of a software group.
- A) Project manager
- B) System engineer
- C) System administrator
- D) All of the mentioned above

(IX) CASE Tool is
- A). Computer Aided Software Engineering
- B). Component Aided Software Engineering
- C). Constructive Aided Software Engineering
- D). Computer Analysis Software Engineering

(X) All critical path activities have slack time of
A). 0 B). 1 C). 2 D). None of above

(XI) The SCM repository is the set of ____.
A) Project database
B) Mechanisms and data structures
C) A tracking and control
D) None of the mentioned above

(XII) Software configuration management is a set of ___ activities.
A) Change management
B) Process
C) Tracking and control
D) None of the mentioned above

Group-B (Short Answer Type Question)
Answer any three of the following [5 x 3 = 15]

2. Write the short notes on: Rayleigh curve, [5]
3. Discuss the basic COCOMO model for software cost estimation [5]
4. Write short notes on: Software project plan [5]
5. Write the short notes Re-engineering legacy systems. [5]
6. Write the short notes white box testing [5]

Group-C (Long Answer Type Question)
Answer any three of the following [15 x 3 = 45]

7. a) Explain the software life cycle model that incorporates risk factor [15]
b) Draw the Context level DFD and Level 1 Data Flow Diagram for the system whose requirements are summarized as follows –
A store is in the business of selling paints and hardware items. A number of reputed companies supply items to the store. New suppliers can also register with the store after providing necessary details. The customer can place the order with the shop telephonically or personally. In case items are not available, customers are informed. The detail of every new customer is stored in the company's database for future reference. Regular customers are offered discounts. Additionally details of daily transactions are also maintained. The suppliers from time to time also come up with attractive schemes for the dealers. In case, scheme is attractive for a particular item, the store places order with the company. Details of past schemes are also maintained by the store. The details of each item i.e. item code, quantity available etc. are also maintained.

8. a) How function point analysis methodology is applied in estimation of software size? Explain. Why FPA methodology is better than LOC methodology ? [15]
b) An application has the following:10 low external inputs, 12 high external outputs, 20 low internal logical files, 15 high external interface files, 12 average external inquiries and a value adjustment factor of 1.10 . What is the unadjusted and adjusted function point count ?

9. a) Define coupling and cohesion. What are the different types of coupling possible between various modules of a software system. [15]
b) Discuss why "low coupling and high cohesion" are features of good design
c) Compute function point value for a project with the following domain characteristics:
No. of I/P = 30
No. of O/P = 62
No. of user Inquiries = 24
No. of files = 8
No. of external interfaces = 2
Assume that all the complexity adjustment values are average.

10. What is regression testing? [15]
What is alpha testing?
What is BETA testing?

11. 'Software doesn't wear out' justify
Write the IEEE definition of software engineering
Mention the characteristics of software contrasting it with characteristics of hardware

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PEC-IT501B Artificial Intelligence

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

[1 x 10 = 10]

1. Answer any ten of the following :
   (I) what are the two characteristics of heuristic knowledge?
   (II) List the quantifiers in first order logic.
   (III) List the two types of Parsing
   (IV) The first and the most simple step in problem-solving is:
   a. Goal Formulation b. Problem Formulation c. Path Costing d. None of the above
   (V) which search algorithm requires less memory?
   (VI) Knowledge-based agents are composed of two main parts. What are they?
   (VII) How Many Data Type Predicates are there?
   a. one. b. Two. c. Three. d. Four.
   (VIII) Define Explanation-based learning?
   (IX) A production system consists of _____steps
   a. one. b. Two. c. Three. d. Four
   (X) Face Recognition system is based on which type of approach?
   (XI) Define Flat Local Maximum ?
   (XII) List the four ways of knowledge representation.

Group-B (Short Answer Type Question)

Answer any three of the following [5 x 3 = 15]

2. Explain DFS in AI. [5]
3. what are the kind of knowledge which needs to be represented in AI systems? [5]
4. Explain PEAS Representation Model with an example. [5]
5. What are the differences between the A* algorithm and the greedy best-first search algorithm? [5]
6. Explain Utility based agents with suitable diagram. [5]

Group-C (Long Answer Type Question)

Answer any three of the following [15 x 3 = 45]

7. (a) Define Tic-Tac Toe Problem. [3]
   (b) Explain with an Example [12]
8. Explain Bidirectional search algorithm with an example [15]
9. Discuss about features of environment. [15]
10. (a) State the main features of Hill Climbing Algorithm. [3]
    (b) Compare Simple hill Climbing algorithm with Steepest-Ascent hill-climbing [8]
    (c) what is Simulated Annealing? [4]
11. Give some application areas of AI in Healthcare sector? [15]

*** END OF PAPER ***

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PCC-CS501 Compiler Design

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

[1 x 10 = 10]

1. Answer any ten of the following :
   (I) If all the operators are binary, then a string of operands and operators is a postfix expression if and only if _____
   (II) Given a grammar G=(V, T, P, S) and every production in P is of the form A->α where A is in V and α is in (V U T)*, then G is _____
   (III) A compiler running on computes with a small memory would normally be
   (IV) Input to LEX is
   (V) A basic block is _____
   (VI) Given a finite automaton M=(Q,Σ, δ , q0, F). If δ maps Q × Σ to 2 Q, then _____
   (VII) Given a string abc , the string acc is a _____
   (VIII) A garbage is _____
   (IX) How many descriptors are used for track both the registers (for availability) and addresses (location of values) while generating the code?
   (X) A synthesized attribute is an attribute whose value at a parse tree node is defined in terms of _____
   (XI) Elimination of loop invariant computation is a peephole optimization. True/False?
   (XII) _____ is a loop optimization

Group-B (Short Answer Type Question)

Answer any three of the following [5 x 3 = 15]

2. Describe input buffering in lexical analyser. [5]
3. Explain the model of a non recursive predictive parser with a diagram. [5]
4. Find the output, given grammar G1 and associated semantic rules and input: aadbd [5]
   - S->AS {print(1)}
   - S->AB {print(2)}
   - A->a {print(3)}
   - B->b C {print(4)}
   - B->d B {print(5)}
   - C->c {print(6)}
5. What is ambiguity? Show that G2:{S->aS|Sa|a} is ambiguous [5]
6. What is code optimization? Optimize the following C-code: [5]

```
count=0;
result= 0;
while(count++ < 20)
{
increment= 2*count;
result +=increment;
}
```

Group-C (Long Answer Type Question)

Answer any three of the following [15 x 3 = 45]

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PCC-CS502 Operating Systems

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]

(I) The _____ must design and program the overlay structure.

(II) If one or more devices use a common set of wires to communicate with the computer system, the connection is called _____

(III) _____ systems have more than one CPU in close communication with the others.

(IV) FIFO scheduling is _____

(V) A situation where several processes access and manipulate the same data concurrently and the outcome of the execution depends on the particular order in which access takes place is called _____

(VI) A solution to the problem of external fragmentation is _____

(VII) _____ will happen if a non-recursive mutex is locked more than once?

(VIII) Each entry in a translation lookaside buffer (TLB) consists of _____

(IX) On systems where there are multiple operating system, the decision to load a particular one is done by _____

(X) Trap is a _____

(XI) _____ are the operations that can be invoked on a condition variable

(XII) Under multiprogramming, turnaround time for short jobs is usually _____ and that for long jobs is slightly _____

Group-B (Short Answer Type Question)

Answer any three of the following [5 x 3 = 15]

2. What is a process? With the help of a diagram, explain the different process states. [5]
3. Explain with example pre-emptive and non pre-emptive scheduling algorithms [5]
4. What is spooling? Compare SJF and SRTF. [5]
5. Prove Dekker-Peterson's solution ensures mutual exclusion. [5]
6. Is segmentation possible without paging? Justify your answer. [5]

Group-C (Long Answer Type Question)

Answer any three of the following [15 x 3 = 45]

7. Explain multi level feedback scheduling. List the different criteria for scheduling algorithms. [5+5+5]
For the processes listed in the table, calculate the average turn around time and average waiting time, for RR (quantum=2) and SRTF.

Process	Arrival Time	Burst Time
P1	0	3
P2	1	6
P3	4	4
P4	6	2

8. List down the methods of deadlock detection and deadlock avoidance. Explain how deadlock can be recovered through deadlock. What is livelock? [4+4+4+3]
9. Make a comparative analysis of the various scheduling algorithms, How does synchronization and scheduling go hand in hand? [8+7]
10. Define critical Section. Mention the mechanism to control access to critical section.Explain how use of monitors guarantees mutual exclusion. [3+4+8]

11. Discuss about shell and kernel. Explain the process of booting. Explain forking. Discuss about orphan, zombie and daemon process. [4+2+3+6]

*** END OF PAPER ***

7. For the following grammar [3+5+5+2]

E-> E or T|T
T->T and F|F
F-> not F|(E)| 0|1

a) Eliminate left recursion from the above grammar
b) Find FIRST(X),Follow(X) for each variable in the grammar
c) Construct a predictive parser table for the grammar
d) Is the above grammar LL(1). Justify your answer

8. a) What is a compiler? [2+10+3]
b) Explain the different phases of compiler with an example
c) Compare and contrast between a compiler and an interpreter

9. i) Express the expression y=(a+b)*c in [9+6]
a.)postfix notation
b.) Abstract syntax tree
c). Three address code
ii) Implement the TAC using
a. quadruples
b. triples
c. indirect triples

10. Consider the regular expression (a+b)*a(a+b)(a+b) [3+6+3+3]
I. Augment the expression and construct the syntax tree for the above regular expression
II. Find Firstpos() and Lastpos() for every internal node in the syntax tree
III. Find Followpos() for every position in the syntax tree
IV. Construct the corresponding DFA for the given RE using Followpos()

11. a) What is LEX? [1+5+9]
b) Explain the working of LEX
c) Show the step by step construction of a lexical analyzer with the following three tokens
- a
- abb
- a*b+

*** END OF PAPER ***